

**COLONY & PROTECTORATE
OF KENYA.**



ANNUAL REPORT
OF THE
DEPARTMENT of AGRICULTURE
FOR THE
YEAR ENDED 31ST DECEMBER,
1924.

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ANNUAL REPORT

1925

DEPARTMENT OF AGRICULTURE

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REPORT OF DIRECTOR.

STAFF, &c.

Excepting for an increase in the provision for the development of Native Agriculture, the appointment of one Inspector of Plantations to assist in the better administration of the Diseases of Plants Prevention Ordinance, and the establishment of a branch for Agricultural Chemistry, the services remained essentially the same as in the previous year. The Department has partly recovered from the heavy retrenchment which took place in 1922 during a period of financial stringency, and every effort has been made to render essential services with the limited staff. At Headquarters difficulty has been experienced not infrequently in keeping the administrative section working smoothly on account of the increase in the volume of work and the paucity of staff. An increasing recognition of the need and value of experimental and research work is apparent in the land, but in some respects the Department is unable, for reasons beyond its control, to keep pace with the agricultural progress of the Colony, and is unable to furnish all the information sought from time to time. In order to perform its proper functions with satisfaction to those whom it serves, a Department of Agriculture should be enabled to work in advance of the need, and anticipate the wants of the agricultural community, but that cannot be done with an attenuated staff and without proper facilities. Advisory services are being rendered to an increasing extent by the several sections of the Department, and the Reports of Officers—attached hereto—reveal a considerable amount of useful research and experimental work, but it should be mentioned that there are limits to the use and value of field experiments conducted in co-operation with

farmers; and, as shown by the experience of other countries, such co-operative experiments should only be regarded as supplementary to the activities of properly staffed and equipped experiment stations. It is always difficult, and sometimes impossible to maintain continuity and efficiency in technical and scientific services when, as is at present the case, the branch is only represented by one unit; though it is hoped that, as the activities of the Department expand, there will be at least two qualified officers in each important branch, so that, in case of illness and absence on leave, the work can be carried on without serious interruption, loss of time; and, as has already happened, loss of valuable material and records.

FINANCIAL.

The Statements of Expenditure and Revenue for the fiscal year under review are given hereunder.

EXPENDITURE.

	Amount sanctioned. £	Amount spent. £
Administrative & General ...	16,253	17,052
Native Agriculture ...	10,320	8,108
Henry Scott Agricultural Laboratories	4,787	4,258
Contributions to Imperial Bureaux of Etomology & Mycology, ...	400	800
Grading & Inspection Export Produce, &c.,	1,618	1,429

VETERINARY.

(a) Administrative & Executive Division,	21,338	20,853
(b) Native Reserves, ...	9,904	8,817
(c) Research Division ...	21,790	20,766
(d) Division of Veterinary Advisor ...	749	894
	87,159	82,977

Special Expenditure—Chemical Laboratory fittings & equipment.	500	480
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Total Agricultural Department:—	£ 87,659	£ 83,457
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REVENUE.

	Estimated. £	Collected. £
Farm Produce & Stock	25	86
Agricultural Produce, grading &c., ...		
inspection fees, ...	2,000	2,626
Testing Dipping fees, &c., ...	6,350	11,772
Sera, Vaccines, & laboratory products, ...	4,000	6,843
	£ 12,375	£ 21,327

The savings in the vote for Native Agriculture were due to new appointments not having been made as early as was anticipated. There was a substantial increase in revenue derived from Veterinary Services. In the previous year there was a considerable shortfall due to the state of depression, and the estimates for 1924 were, therefore, framed on a conservative basis. The marked improvement in the financial position of farmers in 1924 was reflected in additional revenue derived from stock inoculations, &c.

GENERAL.

The Agricultural Year, 1924 was, on the whole, above the average in respect of yields of crops. The rainfall was generally below the average, but its distribution throughout the year was better calculated to prevent serious drought. Excepting in restricted areas, where Coffee and Maize suffered from inadequate rainfall, the conditions were favourable for crop production. Similar conditions prevailed throughout the native reserves; in no area did the natives suffer from a serious food shortage, and in many cases there has been an increasing and substantial surplus available for sale.

In a previous report it was indicated that in 1922 "low-water" mark had been reached, and there were signs of a marked improvement in 1923. The year 1924 is noteworthy for the almost complete recovery from the depression of 1921 and 1922, which was due primarily to the change in currency coupled with a sudden fall in market prices, while costs of production remained high. The market prices of the main agricultural products exported were abnormally high, and, with crops throughout the country generally good, and no untoward losses among livestock due to disease, the year 1924 will be a memorable one in respect of the confidence which it has restored in the agricultural industry, and the prosperity which it has brought to all sections of the community. The reward of development in the post-war period is now being reaped, and the figures which will be quoted later in this report reveal a substantial increase in the tonnage of traffic of agricultural produce. The increased production, and, as a consequence, the increased purchasing power of the community is reflected in no uncertain fashion in the railway traffic and the revenue, beyond all expectations, derived from railway freights. Not alone is this seen in the increase of agricultural exports, but the volume of imports has been greatly augmented.

There is evidence of greater attention being given to expenditure on farm holdings, and, with greater experience on the part of occupiers, costs of production have decreased on many farms and estates. Difficulties in securing a steady and satisfactory supply of labour have also tended to prevent the wasteful use of labour, which was not uncommon in past years. In respect of

the main products, the profits in 1924 have been high, but it would be a mistake to base future returns upon the abnormally high prices at present ruling, and there is need for the exercise of sane judgment in the purchase of land, in the expenditure of money upon development, and in effecting economies in management expenses and expenditure upon labour in order to keep costs of production below the limit of prices to which the products are likely to fall.

The financial position of producers has shown a marked improvement, and Mortgages and Bank Overdrafts have been substantially reduced. The rate of Interest charged by Mortgagees and by Banks is, however, very high in comparison with that which agriculturists require to pay in most other countries.

Merchant firms trading in the export produce common to Kenya have shown great interest in securing information, and new business connections have been established; indeed there is evidence that there is much competition, and no shortage of Capital for the trade in agricultural export products.

METEOROLOGICAL.

The slender provision made for the taking, recording, and computation of Meteorological Records, has not enabled the service to be extended. The number of Stations in operation during the year was 207, comprised as follows:—

	No. of Stations.
(a) Agricultural, Forestal, & Public Works,	17
(b) District and Military Stations,	37
(c) Railway,	18
(d) Private,	125
Total	207

A Meteorological Report, containing a mass of valuable information covering rainfall, temperature readings, &c., &c., is published annually.

A summary of Meteorological Records for 1924 is given hereunder:—

AGRICULTURAL STATISTICS.

The Fifth Annual Agricultural Census for 1923—24 was taken, and the results were published in a separate report, from which extracts are made for purposes of this Report.

Imports.—The following table, showing the quantities of foodstuffs imported in 1914 and in the post war years, is of interest; they are for Kenya and Uganda, separate figures not being available for Kenya:—

		QUANTITY.										VALUE £.				
		1924.	1923.	1922.	1921.	1920.	1919.	1914.	1924.	1923.	1922.	1921.	1920.	1919.	1914.	
Wheat	... Cwts.	1,993	1,983	900	1,352	337	681	5,585	1,623	1,590	879	1,900	515	845	3,091	
Wheat Meal & Flour	... "	48,474	47,399	59,817	78,069	76,823	83,171	81,808	40,792	40,362	63,775	102,025	112,795	94,989	52,890	
Ham & Bacon...	... "	23	5	9	20	118	23	701	217	73	117	285	1,368	205	4,256	5
Butter	... Lbs.	1,120	560	4,032	11,981	3,890	43,820	34,997	122	74	412	1,383	515	4,213	1,972	
Cheese	... "	3,248	1,456	1,792	2,561	12,636	4,449	38,836	292	180	201	354	922	167	1,820	
Ghee	... Cwts.	8,592	5,253	4,209	1,878	600	3,075	2,347	28,740	13,717	14,631	43,900	5,310	8,202	8,702	
Condensed Milk	... "	5,352	3,105	1,305	4,560	5,210	5,308	9,468	20,851	11,912	5,247	25,076	22,554	23,032	20,498	
Sugar	... "	27,446	31,632	69,212	65,958	47,921	71,651	74,485	42,904	54,041	89,405	129,869	167,554	126,849	54,829	

A comparison of 1924 figures with those of 1923 show that approximately equal quantities of "Wheat and Wheat Flour" were imported in these years.

The slight increase in the imports of Butter and Cheese are probably to be accounted for by larger importations of supplies for sporting parties ; but the total is so small as to be of little consequence.

Importations of Ghee show a substantial increase, but, as there is a cross trade—difficult to trace—it does not follow that progress has not been made in Ghee production. On the contrary there is reason to believe that the production of Ghee in Kenya has increased. There is a further reduction in the Imports of Sugar, but there remains a considerable import,—27,626 cwts.,—to be displaced by local industry. The total value of the foodstuffs, shown in the schedule, which might be produced locally, stands at £135,541 for 1924. In 1921 the value of the same importations was £274,792.

A comparative Statement, showing quantity and approximate value of
Agricultural Commodities from the Colony and Protectorate
1919—1924 inclusive, is shown hereunder :—

		QUANTITY.					
		1924.	1923.	1922.	1921.	1920.	1919.
Animals, living :							
Cattle	... No.	4,195	2,052	70	7	1	2
Sheep and goats	...	19,530	15,777	438	553	609	331
Horses	... "	...	...	...	...	...	...
Mules	... "	23	6	3	7	1	2
Donkeys	...	...	...	...	...	...	...
Camels	...	...	...	...	...	...	...
Miscellaneous	...	66	255	118	207	57	72
Bacon and ham	... cwts.	204	660	925	736	...	5
Butter	... lbs.	111,588	55,888	18,768	2,634	...	...
Cheese	... "	39,210	44,128	22,314	7,462	...	200
Coconuts	... cwts.	1,080	574	620	716	950	475
Coffee	... "	160,880	139,060	77,902	98,987	106,386	71,545
Copra	... "	39,271	13,457	13,960	4,702	10,250	35,130
Cotton	... "	2,190	605	500	...	...	...
Fibres :							
Sisal	... "	228,305	176,400	179,400	134,722	108,049	89,621
Flax	... "	14,577	21,270	38,500	8,818	6,029	9,352
Fodder and offals	...	11,470	...	...	...	...	...
Ghee	... "	1,167	...	...	...	...	...
Grains :							
Beans and peas	...	See	Pulse	7,545	6,756	62,546	26,861
Ground nuts	... "	30,977	39,160	21,403	4,204	1,790	...
Maize	... "	1,144,050	870,701	387,718	52,363	335,408	55,770
Millet	... "	773	13,573	2,537	1,698	8,152	240
Pulse	... "	56,281	30,024	3,942	2,042	13,062	2
Sim-Sim	... "	80,404	52,660	2,033	17,611	35,777	26,747
Wheat	... "	1,925	93	386	121	908	130
Miscellaneous	...	1,263	1,451	1,931	3	141	848
Hides	... "	47,854	35,301	20,279	10,878	24,787	23,911
Oil :							
Sim-Sim	... galls.	10,057	12,829	...	7,2 2	2,469	1,594
Potatoes	... cwts.	36,521	22,349	16,061	22,517	30,889	26,232
Seeds :							
Castor	... "	4,656	200	...	1,205	...	...
Flax	... "	8,036	5,840	8,020	2,816	280	2
Skins :							
Sheep and goats	No.	716,726	568,609	194,656	571,648	515,536	491,682
Miscellaneous	...	6,474	593	4,011	9,269	11,289	5,880
Sugar	... cwts.	2,972	...	...	...	...	...
Tobacco	...	157	32	69	32	95	130
Wattle bark	... "	71,416	17,794	9,414	...	9,025	4
Wool	... "	4,409	4,387	5,660	1,807	3,351	4,795
Total	...	...	...	...	...	...	...



The total value of agricultural exports has increased from £1,325,440 in 1923 to £2,149,776 in 1924, or an increase of £824,336 over that of the previous year,—equivalent to 62·19 per cent.

The increase in tonnage of crops exported was 22,506 tons, or 32·29 per cent over the same period. On account of the fluctuations in values, it is sounder to estimate progress by comparing quantities rather than values. In comparing figures of quantities of the main products exported during 1923 with those of 1924, the following increases and decreases (percentages) are indicated :—

			Increase per cent.	Decrease per cent.
Bacon & Ham	...	...	...	69
Butter	...	...	99	...
Cheese	...	...	...	11
Coffee	...	...	16	...
Cotton	...	...	262	...
Flax	...	...	...	31
Grains (excluding Maize)	...	...	44	...
Ground Nuts	...	...	...	21
Hides	...	...	35	...
Linseed	...	...	38	...
Maize	...	...	31	...
Potatoes	...	...	63	...
Sisal	...	...	29	...
Skins	...	...	26	...
Wattle Bark	...	...	301	...
Wool	...	...	5	...

ACREAGE, OCCUPATION, &c.

The total area allotted for occupation by Europeans is 4 $\frac{3}{4}$ million acres, and, in addition, an estimated area of 2 $\frac{1}{2}$ million acres is available for alienation. Of the area allotted 4,443,180 acres are in actual occupation, showing an increase of 457,809 acres over the previous year.

The number of occupiers has increased from 1,466 as at 30th June, 1923, to 1,715 as at the same date in 1924. The total area cultivated is 346,988 acres, giving an average of 202 acres per occupier against 187, 169, and 154, for 1923, 1922, and 1921, respectively. Including the development accounted for by live stock on a basis of 6 acres per head for cattle and 3 acres per head for small stock, the total average acreage developed by each occupier is 1,285 acres.

The figures for individual crops show that Maize, Coffee, Sisal, and Wheat, as heretofore, are the main crops in which notable increases in acreage and production are manifest. Further particulars of crop production and live stock will be found under appropriate heads in this report.

MAIN CROPS.

The total area under crops (non-native) as at June 30th, 1924, was 297,337 acres. For comparative purposes, figures for the previous year are also given, and the percentage increase or decrease is shown.

Crop.			1924.	1923.	Increase.	Decrease.
			Acres.	Acres.	per cent.	per cent.
Maize	...	...	141,147	99,764	41	...
Wheat	...	...	20,910	15,429	35	...
Barley	...	...	725	818	...	11
Coffee	...	...	60,054	52,249	15	...
Sisal	...	...	45,323	39,026	16	...
Flax	...	...	2,133	5,889	...	64
Coconuts	...	...	8,924	8,814	1	...
Sugar Cane	...	...	5,243	4,193	25	...
Miscellaneous	...	...	19,320	21,003	...	8
Total acreage of crops grown			303,779	247,189	...	...
Less Catch Crops			6,442	8,427	...	...
Nett area under crops			297,337	238,763	25	...

MAIZE.

Stimulated by high prices, a low railway flat rate, and provision for grading, the maize industry is making rapid progress. An increase for the year of 41% in the area cultivated on "European" holdings is worthy of note, and considerable extension is likely to continue. Methods of cultivation are being improved,—indeed, on many farms they have already reached a high standard. Despite the high natural fertility of the soil, attention must be given to the maintenance of soil fertility by judicious manuring and rotation of crops. In these directions advice is being given to growers, but experiments require to be made, and to that end the Department hopes shortly to be in a position to carry out some systematic work thereon. For the most part, the maize grown is of the "Flat White" type, consisting of hybrids of Hickory King, Natal White Horsetooth, and Ladysmith White, which were imported from South Africa some years ago. While this cross-bred maize is of high quality for commercial purposes, and gives a high yield, there is need to secure more uniformity in the type grown, and to eliminate growth deficiencies in some of the strains. Some farmers are giving attention to the selection of seed, and this Department has started field selection on a number of farms in the maize belt. In order to test the suitability of different varieties, introductions have been made from the United States of America and South Africa, and seed has been distributed among a number of growers. The extension of maize growing to the higher altitudes, where conditions require early maturing varieties, may be achieved by the introduction of varieties of that kind.

The yields of maize are comparatively high, ranging from 5/10 bags per acre by districts, with an average of about 7 bags per acre for the whole of the settled areas; and on individual farms yields of over 20 bags per acre are not infrequently recorded, all of which are due in no small measure to the fertility of the soil and favourable climatic conditions. To maintain the present satisfactory position, and to secure necessary improvement, there is wide scope for departmental services, which should prove to be of great value in promoting the industry, not only in "European" areas but in Native Reserves,—and, although much useful work is already being done by the Department, the importance of the work demands and justifies the provision of an Officer, skilled in maize growing, to concentrate his attention upon this crop.

Selection of maize first of all in the field, and thereafter from the crib, has been started on certain farms in the Nakuru area.

The Second Annual Maize Conference,—representative of all interests engaged in the Maize Industry,—was held in December,

and its deliberations again proved to be of value to the Department, particularly in connection with the administration of the "Maize Grading Rules"; also to the Railway Department in connection with the handling of Maize. A representative Maize Consulting Committee, consisting of representatives of (a) The Kenya Farmers' Association and the Plateau Maize Growers, Ltd., (b) the Association of the East African Chambers of Commerce, (c) the Railway Department and H. M. Trades Commissioner for East Africa, with the Director of Agriculture (Chairman), was formed for the purpose of considering important matters which might arise between Conferences.

The total cost of the grading and inspection services for the first year of its operation was £1,720, and the revenue amounted to £2,007, leaving a profit of £287 at a fee of 6 cents per bag.

Government decided to instal and operate a Maize "Conditioning" Plant, and a sum of £10,000 has been voted for its erection. Experience shows that the present 14 per cent moisture content limit is not always safe, and it is intended to reduce that standard to 12·5 per cent as soon as the "Conditioning" Plant is ready; also at the same time to prohibit the export of "weevily" maize.

During the year 1924, the total number of bags of maize received for grading was 689,367; of these 54,908 were rejected for grade, on account of the following defects:—

Wet	...	35,784	or	5·19	per cent.
Musty	...	11,096	"	1·61	"
Weevily	...	7,336	"	1·06	"
Other causes	...	692	"	·10	"

There was therefore rejected for grade 8 per cent. of the maize received. With the exception of the maize rejected under "other causes," nearly all this maize was eventually shipped. The wet maize was dried in the sun at the Port, and re-graded, but a fair proportion of it had to be classed as "musty". During the year a new sub-grade was introduced to provide for Flat White Grade 2 Maize which had become slightly weevily; otherwise it would have fallen in the Under-grade No. 8, and its value would have been unduly depreciated. There is ample evidence that, in the absence of grading, the export of maize from this Colony would be attended with great risks to the traders, and inevitable losses to the producers. The Graders' Certificates have been recognised by Corn Trade Associations, and the only serious complaint received during the year concerned a shipment of 200 tons of Grade 7 (Mixed Native) which had to be discharged at Durban on account of heating. The cause of this unfortunate mishap has not been satisfactorily established, but at the time of its occurrence it was found necessary to sample for grading purposes all bags of native maize in several places, as it was found that the maize in these bags varied considerably in condition in different parts of the bag, and malpractices were suspected.

The "block-stacking" system for the storage of graded maize pending shipment had inevitably to be adopted, on account of shortage of space in the wharf sheds, and the Railway Department was unable to provide essential facilities for the weighing of maize for export. Experience shows that, without sufficient check weighing, some traders may have suffered losses which they should not have been called upon to bear, and in itself that the block-stacking system is not suitable for East African conditions where deterioration frequently take place in stored grain, and the aim should be to dispense with it entirely as soon as circumstances allow.

WHEAT.

The areas sown to Wheat and wheat production during the last three years are as follows, showing substantial progress:—

	Actual production.
1922—13,696 acres,	35,793 bags,
1923—15,429 „	55,920 „
1924—20,910 „	Not yet available.

As shown in the Census Report, the yield per acre shows an upward movement,—due to a better knowledge of the more suitable wheat growing districts and soils, and to the use of seed of varieties possessing greater rust resistance. With the assistance of growers, steps have been taken to secure information and advice with regard to the suitability and quality of Kenya Wheats for the English and South African Markets. It is seen that some of the Wheats of this Colony possess high milling quality, and will be useful for blending with "soft" wheats. As shown in a previous schedule to this report, the import of a quantity of wheat flour continues; about half the importation is used at the Coast, and the remainder—approximately 1,200 tons—is railed to up-country stations. To displace that import, which includes the needs of Uganda, the area of wheat has only to be extended by about 8,000 acres, and, as the import of Wheat Flour into Tanganyika be also considered, a further addition of 9,000 acres would be required to provide a supply of wheat sufficient for all these territories on the present scale of consumption. Unless, however, locally grown wheats can be so blended as to produce in baking as good results as are obtained from the use of a small percentage of imported flour, some importation is likely to continue, and there may come about an export of wheat with a continuation of some import of flour. Another flour mill, equipped with modern machinery, is being erected, and with that increase in milling plant further progress should be made. The Plant Breeder has considerably extended the knowledge of the behaviour of varieties against the three main forms of rust prevalent in the Colony,—*Puccinia Triticina*, *P. Graminis*, and *P. Glumarum*,—and his report appended indicates that the presence of rust is closely connected with altitude,

The work of that Officer is undertaken at the Scott Agricultural Laboratories on hybrids and pure-line selections, and, in co-operation with farmers on a number of farms in wheat growing districts, trials are made, and seed of the most promising varieties is multiplied for distribution.

From previous crosses, some 40,000 grains of F2 and F3 families were separately sown by hand in the breeding cage at that Laboratory; also 520 pure-line varieties in triple row rows, and in multiplication plots. Recent observation records have now enabled the number for future trials to be reduced to 85 varieties, of which seed varying in quantity from a few ounces to 250 lbs. is available. Work along similar lines on an extensive scale was carried out on a farm at Njoro.

Pure-line varieties consist of selections of single plants from the many mixtures of wheat found in the country in 1921, 1922, and 1923, and also from importations of wheat varieties during those years. The best of these varieties will be issued in fair quantity in time for sowing in 1926.

Promising results have been obtained from a distribution in quantity of a new variety and strains thereof named "Droop".

Within the next few years, the value of the work of the Plant Breeder should be seen on the Wheat Farms.

From material on hand, and being multiplied, it is believed that there will shortly be in hands of growers varieties of wheat which, in respect of yielding power, resistance to rust, and milling quality, will excel any hitherto known in the Colony.

EXPERIMENTAL WORK IN CO-OPERATION WITH FARMERS.

About 90 varieties were chosen from the 520 varieties mentioned earlier in this report, for trial in six different districts.

These districts were:—Machakos, West Kenia,
Uasin Gishu Plateau, Trans Nzoia,
Solai Escarpment, Keringet.

Owing to bad weather conditions this year, and depredations by game, the only reliable information obtained from these experiments was as to the rust-resistance of the varieties concerned. In this connection it can be stated that there are ample varieties at our disposal, both rust-resistant and of good milling quality, from which to choose for issue to these districts.

Puccinia Triticina (Orange leaf rust) attacks wheat in all parts of the country.

Puccinia Graminis (Black stem rust) attacks wheat severely at Machakos, West Kenia, Njoro, and parts of the Uasin Gishu Plateau.

Puccinia Glumarum (Yellow leaf rust) attacks wheat severely at Njoro, Solai Escarpment, and Keringet.

Puccinia Glumarum and *Puccinia Graminis* are the two dangerous rusts. Their presence or absence in a district appears to be closely connected with altitude. Njoro seems to be the only place where wheat is liable to be attacked by both; fortunately, we now have varieties resistant to both.

In order to assist growers in securing good seed of approved varieties, a Seed Wheat Register has been introduced.

BARLEY.

Seed of "two rowed" Malting Barley has been distributed. Importation of Syrian Barley was also made for the same purpose. Although it is known that the Colony can produce Barley of high quality for malting purposes, and the yield has in many cases been good, it is disappointing that progress is not being made. The drawbacks are probably the absence of a local market to foster the growth of the crop, pending the establishment of trade connections oversea, and the risks of deterioration in quality due to weather conditions at the time of harvesting.

COFFEE.

The important place occupied by the Coffee Industry is shown in the returns of Agricultural Exports. The value of Coffee exported is more than double that of any other export product, and about 37 per cent of the total value of Agricultural Exports is represented by Coffee. The exports for the year reached the record figure of 8,044 tons, valued at approximately £800,000. Record prices were also obtained; the year's average price in London for Kenya Coffee being approximately £125 per ton. An important decision was made by the trade -on representations previously made from the Colony to establish "Kenya" as the trade name for the Coffee hitherto marketed as "Nairobi". With better equipment on the Coffee Estates, and with the greater experience and skill which is being acquired in the handling and preparation of the crop for market, an improvement in the quality of the output is noticeable, and the demand for it is increasing.

In some districts difficulties were experienced in picking the crop at the proper time, on account of labour shortage, and in many cases the crop was only secured without serious loss by sacrificing essential work in the plantation, and by deferring work of development.

In every direction substantial progress is being made. The area planted has increased by nearly 8,000 acres during the previous Census year, bringing the total area to 60,000 acres, of which 33,000 acres are in bearing. There is further scope for expansion in the large area of land suitable for coffee growing

which remains undeveloped. But, with the continued growth of the industry, the risks due to diseases and pests are not lessened; on the contrary, there are greater opportunities for their spread, and, while the industry has not suffered from widespread losses hitherto, there exists the greatest need for constant vigilance, investigation and prompt action. With the appointment of an "Inspector of Plantations," made during the period under review, the necessary steps have been taken to tighten up the administration of the Diseases of Plants Prevention Ordinance.

At the present time "Mealy Bug" (*Pseudococcus Citri*) is a serious menace, and has caused serious loss on a number of plantations,—particularly in the Ruiru and Thika Districts. Every known and suggested treatment and control measures have been tried and investigated, with the valued co-operation and assistance of planters, but with little success. The most promising means are likely to be found in predaceous and parasitic insects leading to biological control. To that end, a Californian "Ladybird" was imported from South Africa, and distributions of larvae and adults bred therefrom have been made to infested Plantations. Arrangements have also been made for the Entomologist to visit Sicily, during his period of leave, for the purpose of collecting, breeding, then despatching to this Colony, a supply of the Sicilian Mealy Bug parasite, which has proved so successful in controlling the same Mealy Bug in the Citrus Orchards of California.

Serious damage has been done on the Uasin Gishu Plateau by the "Coffee berry" disease, which has engaged the close attention of the Mycologist, who has succeeded in establishing its identity as *Colletotrichum Coffeanum*, and in introducing satisfactory control measures.

The Senior Coffee Officer was away on leave for the greater part of the year, but in the remainder of the year he gave 232 interviews at his office, sent out 166 letters of advice, and travelled 924 miles visiting plantations. In co-operation with planters, experiments upon new methods of training and pruning coffee bushes, and upon the shading of coffee, are being conducted.

Present indications point to results of great value being obtained, which are likely to bring about changes in methods of coffee culture in this Colony; but, as conditions vary considerably in different districts, there is still a great deal to be learnt.

For instructional purposes, also for the purpose of carrying out variety trials, and experimenting upon different methods of pruning under close observation, the following varieties have been raised at the Scott Agricultural Laboratories:—

Jackson's Hybrid, Kent's Arabica, Mocha, Mysore, and Blue Mountain.

Subsequent to his appointment in July, the Inspector of Plantations visited 107 coffee estates, and has systematically recorded diseases and pests observed. Though many of them were widespread, comparatively few were causing any serious damage,—the most serious pests being “Mealy Bug” and “Antestia.” Seventeen plantations were found in a dirty and neglected condition, and Notices under the Diseases of Plants Prevention Ordinance were served on the occupiers.

The Department is staffed wholly inadequately to deal with those services, which should be rendered to the rapidly extending coffee industry. A gesture has been made, through the Coffee Planters’ Union, that, having regard to the prosperity of the industry, and the specific nature of the services, the planters should in some equitable manner meet the cost of additional staff, &c., provided that the expenditure of the money so contributed should be made in accordance with the wishes of a body representing the planters. The Department would acknowledge the useful work which is being done for the industry by the Coffee Planters’ Union, with whom the staff of the Department works in close accord, and in a spirit of mutual assistance.

SISAL.

Although an increase of over 6,000 acres is recorded in the area planted—the acreage for the last two years being 45,223 and 39,026 respectively—it is somewhat disappointing that more rapid progress is not being made. It has been proved that vast areas in different parts of the Colony are suited to the production of Sisal Fibre of high quality, and, that, under good management, large profits may be made. Yet Capital is not being invested in the development of the industry to the extent which the case warrants. That seems to be due to the unsatisfactory balance sheets of Sisal Companies in years past. In many cases losses were incurred through conditions created by the War as affecting the development and management of sisal estates, and in others the industry suffered through inefficiency and inexperience; but, with the wise expenditure of Capital upon development and efficient control and management, the industry offers great opportunities for profit.

The export of sisal for the year under review reached 11,415 tons, and at the high prices ruling its value amounted to £396,777. Reports show that, while the marks of several estates can be relied upon in respect of grading, in other cases sufficient care is not exercised in preparing the fibre for market and grading it. With a view to assisting the trade and producers in removing difficulties and correcting deficiencies, the writer made suggestions to the London Hemp Association, whereby standard grades for East Africa should be set up by

that body, and that samples thereof should be supplied to each producer for guidance; further, that these samples should also be available at the offices of Departments of Agriculture and elsewhere for reference purposes.

FLAX.

Again, a reduction in the acreage falls to be recorded, and flax growing now ranks as a minor activity. The acreage harvested had dropped from 11,781 in 1923 to 5,348 in 1924. Although interest in flax has revived with an improvement in prices and a steadier market, the crop does not appear to be attracting new growers. It is, however, a profitable crop on those farms at the higher altitudes where there is no great choice of suitable economic crops, and, that being the case, efforts should continue to be made to foster it, and to extend its cultivation where conditions are suitable.

Under the permissive system, the Flax Officer graded 166 tons of Flax and 145 tons of tow,—the revenue derived from fees amounting to £352. Only about half the flax and tow produced is offered for grading, and the present position has proved to be unsatisfactory to the trade and to progressive growers. It is considered that the time has arrived when, if grading is to be continued, it should, in the interests of all concerned, be made compulsory. The retention of the services of the Flax Officer, who would undertake the grading, would then be justified, and the value of his services in an advisory capacity—which is recognised by the growers—would not be lost.

In addition to grading, the Flax Officer has conducted experiments, in co-operation with flax growers, chiefly upon new varieties possessing immunity or resistance to "wilt", and high fibre content. Of these Saginaw and "J. W. Stewart" (ex Linen Research Institute) appear to be very promising. Departmental issues of seed of "Improved Dutch" show good returns.

Interest is being taken in the growing of Linseed for export, and the Department has assisted in importing seed for distribution. The Flax officer has rendered assistance to the Plant Breeder in Maize selection work on farms in the Nakuru District. During the course of the year he travelled 6,000 miles on duty, and enquiries seeking information and advice by correspondence have increased.

COCONUTS.

The area of Coconut plantations (European owned) remains practically constant at about 9,000 acres. It is quite impracticable to attempt to estimate the area or number of Coconut palms in the hands of Asiatics and Natives. It is hoped that the thieving

of Coconuts, which is a serious impediment to progress, will be greatly reduced by the operation of the Coconut Industry Ordinance recently put into operation; but it is regretted that the proposed provision whereby the grant of a licence for the tapping of the palms for "palm wine" was to be conditional upon the land being kept in a good state cultivation, was not permitted to stand as part of the Ordinance. There is little tangible evidence of progress in the care and management of Non-European plantations. The quantity of Copra exported amounted to 39,271 cwt. valued at £46,473, or nearly treble the quantity and more than treble the value of the copra exported in each of the previous two years. The increase is to be accounted for by the production from European-owned plantations now coming into bearing, and also to the improvement in price.

SUGAR CANE.

The increase in the area of Cane for the year only amounted to 1,049 acres, and the total has only reached 5,242 acres. Considering the opportunities for supplying sugar for local consumption, and the suitability of different parts of the country for growing sugar cane, the rate of progress is somewhat disappointing. Three mills (two of them of small capacity) are now in operation for the manufacture of "crystallised" sugar. In a previous schedule in this report it was shown that there was a big drop in imports of sugar between 1922 and 1923, but as from 1923 to 1924 the reduction in import only amounted to 200 tons, and there was still an import of 1,381 tons, which also included some Jaggery. It should be noted, however, that consumption had probably increased appreciably. To displace that import, an additional area of 2,000/2,500 acres of Cane is required. That should shortly be done, and, having regard also to the production of Sugar in Uganda for the East African Market, an export trade may shortly be anticipated. Representatives of those interested in the development of the Sugar Industry have made enquiries, particularly during recent months, and they have been impressed by several favourable conditions,—among them being the comparatively long period during which Cane can be milled, and the dry condition of the sugar manufactured in Kenya—a valuable quality for storing against market demands.

OTHER CROPS.

To some of these reference will be made under "Native Agriculture".

Little interest is now taken by European growers in the production of Peas and Beans, but the time may not be far distant when the need may arise for their introduction into a rotation calculated to maintain and improve the fertility of soils which have borne a number of grain crops.

A considerable area of Sun Flower and Castor has been planted during the last year, and they promise to be successful.

Great interest has been shown in tea growing. Areas of considerable extent have been acquired by Companies interested in tea production in India, and a number of farmers have been making preparations for tea planting. A large quantity of tea seed has been imported from India and Ceylon. People skilled in tea culture consider that in some areas,—notably Kericho and Limuru,—tea of high quality can be successfully produced on the fertile “forest soil” at a high altitude, and with a rainfall of 60/72 inches well distributed throughout the year. The most doubtful factor at the moment appears to be the adequacy and constancy of the supply of native labour necessary for frequent picking of the leaf.

Some attention is being given to the production of “Essential Oils”.

Credit should be given to a number of settlers for their experimental work in introducing new crops and economic plants.

WATTLE.

The marketing of Wattle Bark has now been undertaken on a proper basis, and exports for the year amounted to 71,416 cwts., valued at £17,901, or more than four times the quantity exported in the previous year. In addition, a Wattle Extract Factory for the manufacture of Tannin is working successfully.

HORTICULTURE.

The production of fresh fruit for local consumption is increasing, but the demand is comparatively small, and any considerable effort spread over a number of farms must depend for a market upon an export trade. With a view to testing the suitability of certain varieties of deciduous and citrus fruits, and the returns to be obtained, arrangements are being made with growers for small experimental shipments to be sent to the Home Markets. A new Horticultural Society has been formed, and under its auspices successful Shows of Flowers, Vegetables, and Fruit, have been held in Nairobi.

“INDIAN” AGRICULTURE.

Accurate Returns, embracing agricultural activities by “Indian” Owners and occupiers of land, could not be obtained, but it is estimated that the total area occupied is about 12,000 acres. The chief products are Maize, Sugar Cane, and Coconuts. Indians own large numbers of draught oxen, and perform much transport work in some districts.

NATIVE AGRICULTURE.

Briefly, the main Departmental effort has been directed towards increasing the surplus of marketable economic crops, chiefly for export, and of improving their quality. With that end in view, the chief activities have centred round the distribution of good seed. The preparation of the crop for market has been given some attention, but there are more difficulties in connection with this phase of the work than with any other operation.

In order to train African Staff capable of working as Agricultural Instructors among their own people, two Agricultural Schools, combined with small Demonstration Farms, have been established.

DISTRIBUTION OF STAFF.

Nyanza	... Five Agricultural Supervisors (including two Senior with 26 Instructors and Field Apprentices.
Kikuyu	... Two Agricultural Supervisors with 11 Instructors.
Ukamba	... One Agricultural Supervisor with 3 Instructors.
Coast	... One Senior Agricultural Supervisor with 1 Instructor.

At the two training centres—Bukura, Nyanza—are 29 apprentices, and at the Scott Agricultural Laboratories, Kikuyu, are 32 apprentices.

In addition, the following provision is made for Veterinary Services in Native Reserves.—

- 1 Senior Veterinary Officer,
- 4 Veterinary Officers,
- 8 Stock Inspectors, and approximately
- 40 Native Veterinary Scouts.

Certain native areas are also provided for by the Veterinary Staff located in "European" centres.

Weather Conditions-Reserves.—In North Kavirondo, rains were good, although somewhat irregular. Short periods of drought were experienced, whilst the "short" rains were heavy, and continued until the end of the year; crops were good on the whole. In Central Kavirondo the rains were most irregular; and generally very short, especially along the Lake Shore, consequently crops were poor. In South Kavirondo a very dry

season has been experienced, causing anxiety as regards the food supply, and with better "short" rains the situation was eased. In Kikuyu—the mountain area—rains were moderately good, although the lower lying districts suffered from drought. In South Kikuyu the rains were good, both "long" and "short", and a large surplus of produce beyond the needs of the natives for their own use is expected.

In the Ukamba and Teita Reserves a short rainfall caused low crop yields, and grazing became scarce, especially in the Machakos area.

On the Coast normal rains were experienced, and crops were on the whole good. The rainfall is rather light and uncertain for assured crop production, having regard to the type of the soil, &c.

In order to encourage the use of labour saving implements, a number of ploughs, scufflers, and maize shellers, suited to native use, have been issued to selected natives for demonstration purposes.

Maize.—The above large issues of “Flat White” Seed Maize, following on the issues made in previous years, have resulted in large out-turns of good quality export maize. For instance in 1924, in Nyanza—the issues were 40,000 lbs. in North Maragoli, 10,000 lbs. in the “Malamma” area, 40,000 lbs. in the North and South Gem Locations, 3,000 lbs. in the Asembo area. There is a belt of approximately 100 square miles where the coloured native maize has been practically eradicated. Prices for white maize were higher than for native maize, which has considerably encouraged the native to improve his maize types.

In Kikuyu South 38,000 lbs. were issued; the people now realise that the issued type is a high yielder under their conditions. In the North Kikuyu Reserve 69,000 lbs. were issued but sufficient staff was not available to control its culture on the block system. Small issues (15,000 lbs.) were made to the Ukamba and Coast Reserves.

The application of the Grading Ordinance and the provision of a drying and cleaning plant for the treatment of wet and weevily maize will both benefit the native.

Cotton.—This crop has been grown fairly extensively in North and Central Kavirondo; issues have been made in the Coastal areas, also at Taveta and in South Kavirondo, whilst trials have been carried out in the North Kikuyu reserve, Cotton growing has advanced greatly, but the amount of seed issued (322 tons) bears no relation to the amount of crop harvested. Large tonnages of seed were made available for issue from the centres Malakisi, Wamia, Sio, Asembo, and Kisumu, and the acreage planted during the year exceeded 30,000. The purchases of seed cotton from the 1923 sowings from these areas totalled 787 tons. The crop was not well favoured by weather,—wind, hail and drought, reducing the effective acreage but a large increase in cotton is expected. In south Kavirondo, where the crop is in its infancy, not more than 250 acres matured, but at Malindi on the Coast a fair result was obtained, promising well for the 1925 season. A small crop was produced in the Taveta District. In a few years, with the establishment of the crop in those areas best suited to it, the work will assume some proportions, but it should be remembered that only a comparatively small area of Native Reserves in Kenya is “Cotton land”, and on the cotton areas there is no great density of population.

Sim Sim. This crop is now assuming some proportions, and is one highly suited to native systems, more especially as it is a "short" rain crop, and differs in nature from all other crops, grown by the native. It is being introduced wherever possible through the medium of demonstration plots and small issues of seed. A large crop was harvested in 1924, and the new plantings promise well. Some 80,000 cwts. was exported in 1924, but the harvesting and preparation of the seed for market leaves much to be desired.

Beans. As an article of diet, and as later an export crop, beans are grown in most reserves, but the mixture of varieties makes the price much lower than it should be. There will be little difficulty, save the natives' love of striking colour mixtures, in carrying uniformity into the native bean crop, when it is decided to be opportune and possible to do the work properly.

Under pulse there are numerous other crops grown for food purposes in reserves and for Indian residents. Some of the finer pulses, like Chiroko, are highly suitable for export, excellent samples being produced.

Ground Nuts.—an excellent food crop, and one of great value for export purposes. The yield in 1924 has been disappointing owing to the failure of the "long" rains. As a rotation crop with Rice, Maize, Cotton, Sim Sim, Matama, &c., it occupies an important place. A large tonnage of the seed was procured, but as it cannot be secured unhulled, and, as the Department, in the absence of seed farms, is unable to produce the crop, certain losses of seed—due to broken kernels—are bound to ensue. The general distribution of this crop throughout the reserves is highly desirable.

Condition of Reserves.

There is no doubt the Natives are increasing the acreage under cultivation in their reserves, but there are many more acres capable of being developed than there are natives to develop them, particularly with their present methods. The keeping of a great number of cattle in Agricultural Reserves is one of the factors which reduces native effort with crops, but to change such a position will probably take years, and it is doubtful whether it is desirable to contemplate a marked change except by the process of evolution. The condition and appearance of natives also in many parts is improving; the amount of clothing worn is far greater than formerly.

The progress of Native Agriculture may in some measure be gauged by quoting the estimated value of Agricultural Exports of native origin for the last three years:—

	1922.	1923.	1924.
	£	£	£
Animals	1,200	10,000	20,000
Copra & Coconuts	12,000	10,280	35,090
Cotton	...	...	11,860
Ground Nuts	20,000	24,000	26,000
Maize	73,000	120,000	130,000
Milletts	1,000	4,000	300
Pulse	7,000	12,000	15,000
Sim Sim	4,800	22,000	84,000
Hides	45,000	60,000	121,000
Skins	5,000	3,000	30,000
Oil—Sim Sim	...	2,400	2,200
Potatoes	5,000	3,000	4,000
Miscellaneous	1,000	1,000	1,000
TOTAL ...	* 176,000	* 271,680	* 480,360

* Exclusive of cotton grown in Kenya, but ginned and exported from Uganda.

The large variety of exportable produce of native origin is worthy of note, and to this must be added the large unestimated quantity of native grown products of considerable value sold for local consumption.

NATIVE TRAINING CENTRES.

Bukura Training Farm, Nyanza.—This farm was established in order that the Department might train young natives for service in the reserves. The buildings completed are :—School, Maize Crib, Seed Store, and one Apprentice's Hut to hold six boys; five more Huts are almost finished. Bricks are made and burnt on the property; the farm is fenced; a Nursery of 1½

acres in extent is now functioning,—vegetables, trees, fruits &c., being raised. Field crops of the commoner kind are grown, whilst experimental plots are laid down with newly introduced material. Ploughing demonstrations are given: all implements used in agriculture being such as are suitable for native reserve work.

School.—30 pupils have been enrolled under an indenture. There are three native teachers,—one for elementary school work, one for field work, and one for Physical Drill. Agricultural teaching will be given as the pupils advance in elementary field work. Pupils have taken to the course very willingly; it is somewhat arduous, but regular and abundant food with much physical drill has done a great deal of good in the direction of physique, smartness and obedience. The boys have their own small gardens to work in also.

KIKUYU—SCOTT AGRICULTURAL LABORATORY.
This School was first started at the Kabete Farm, and transferred to the Laboratory when the Farm was closed down. The pupils are more advanced than those in Nyanza and are divided into three classes,—Juniors, Second, and Senior.

The number of apprentices in residence has increased from 21 natives in January to 42 at the end of December, 1924. No boys have yet completed training.

School Work. All apprentices attend school for two hours every day, except in busy planting or harvesting seasons. Subjects,—Writing, Reading in Ki-swahili (and English in Senior Class only), Arithmetic, and Geography. Each subject is put to practical use on every possible occasion.

(a) *Practical Training.* Practically all the work necessary on the experimental land is performed by the apprentices. They have to take special duties, such as driving oxen, ploughing, seed-beds, storekeeper, &c., in regular rotation, so that every boy becomes acquainted with the various duties on a farm.

(b) *Classes.* Up to date the boys have been divided into three distinct classes, to facilitate efficiency in training. Very little technical instruction is given to the two Junior Classes, as their minds are not sufficiently trained for the reception of such work.

(c) *Gardens.* Every apprentice has a garden of 1/20th of an acre to work during his own time. This is found to be a valuable asset in the training of originality in pupils, and at the same time helps those in charge to gauge the worth of the individual man. On the whole, the pupils are keen, and the work is encouraging.

The subjects undertaken during the year with the Senior Class were:—

(1) *Plants*.—Parts of a plant and their function, Nutrition and reproduction.

(2) *Soils* &—Origin, formation, classification, and properties.

Tillage.—Tillage operations and weeds with their destruction, &c.

Soil improvement.

Farm Implements and their care.

Leaflets giving particulars of the culture of the chief native crops have been prepared in simple language, published in English and Ki-swahili in “Habari,” and issued for the guidance of administration and agricultural officers, also native instructors.

LIVESTOCK.

The estimates of numbers of Livestock owned by natives are as follows:—Cattle 3,000,000; Sheep 2,400,000; Goats 3,400,000; Horses & Mules 500; Donkeys 35,000; Camels 150,000.

The Veterinary activities of the Department in Native Reserves are directed towards the making safe of a traffic in cattle. This is accomplished by having testing and inoculating stations in those reserves, from whence valuable and useful trek oxen may be drawn. In addition, the staff is in a position to curtail losses from outbreaks of disease, and in some cases to prevent their spread; and the gradual building up of the system inaugurated may result in much increased trade of great value to the native.

The paper value of native owned stock represents a large amount, but, until the cattle are made marketable, and, until the large wastage of unfit and degenerate stock is reduced, the annual out-turn will bear no proportion to the total value of stock held by natives. For an export industry in animal products difficulty will be experienced in securing cattle in sufficient numbers; although they are there, the customs of the native make him cling to livestock. This may be partly due to the excessive periodic losses which his herds have to bear, and which leave him but few head to recommence breeding up. When the vigor and frequency of the incidence of such visitations is lessened, then the native may adjust his attitude. The demand for native owned stock has increased greatly during the year; money derived from work and from the sale of surplus produce has been spent partly on livestock, and also on beef for consumption by the natives themselves. The native meat seller is much more in evidence in the reserves to-day than has been the case for some years past.

With the development of European holdings, the demand for trek oxen has been so great, together with the reluctance of the native to sell his stock, that the result has been a large and rapid advance in the price of oxen. The Hide and Skin Markets have improved, and much money has gone into the Reserves on that account.

Improvement of Native Livestock. Proposals are under consideration for the improvement of native stock. No doubt measures could be taken which would result in a marked improvement in the size and value of their stock, were powers taken to effect such amelioration. If success attends the investigations now being carried out by the Chief Veterinary Research Officer on the immunisation of cattle against East Coast Fever an additional line of improvement is opened out.

Agricultural Shows.—Native Agricultural Shows, initiated by this Department, and organised by Administrative Officers, with the assistance of this Department, have proved successful, and are calculated to be of educational value to natives,—particularly in crop improvement. Such shows have been held in the districts of Kavirondo, Fort Hall, Machakos, and Kyambu, and they are to be extended to other districts. A new Vote of £250 for “Native Agricultural Shows” has been approved. From that Vote this Department contributes a sum varying from £25 to £50 for prize money at each Show. Other costs have been met from Native Funds, and in some cases the local European community have contributed money and prizes.

The Department would acknowledge its indebtedness to those Administrative Officers who, through their keenness, have furthered the efforts of the Department in Native Reserves, and who have contributed largely to the progress made in Native Agriculture.

LIVE STOCK.

The following comparative table shows the numbers of stock possessed by Europeans as at 30th June, 1924. To native owned livestock reference has been made under the head “Native Agriculture”.

	1920.	1921.	1922.	1923.	1924.
Cattle—Total ...	137,604	161,210	172,397	190,140	211,381
(a) Breeding stock	77,042	92,298	97,260	104,631	110,855
(b) Oxen ...	60,562	68,912	74,137	85,509	100,526
Horses ...	1,269	1,311	1,351	1,454	1,642
Mules ...	996	976	1,257	1,093	985
Donkeys ...	902	1,108	1,512	1,260	1,213
Sheep (Wool bearing)...	89,454	98,168	109,748	112,046	135,916
do. (Native) ...	11,802	16,136	24,137	35,014	32,132
Goats ...	2,654	4,323	5,130	6,258	4,618
Pigs ...	9,450	15,038	16,121	12,120	10,668
Poultry ...	29,354	33,772	34,371	38,685	38,910

The increase in the number of European-owned cattle was 11·17 per cent as compared with 10·29 per cent in 1923.

The increase in Wool-bearing sheep, as compared with the previous year, is 21·30 per cent, and a decrease for Native type of 8·23 per cent, or a total increase in sheep of 14·27 per cent. The number of Goats in the possession of Europeans decreased by 26·21 per cent.

The following table gives the production and sale by Europeans of certain Animal Products during the last few years :—

		Milk Galls.	Cream Galls.	Butter lbs.	Cheese lbs.	Ghee lbs.
1920	...	197,780	14,377	158,587	23,579	15,559
1921	...	249,996	40,231	214,165	58,094	8,791
1922	...	242,324	36,985	236,703	65,520	16,287
1923	...	351,920	43,352	246,544	155,452	97,439
1924	...	381,641	107,709	257,334	148,722	116,123

The forecasts of previous reports as affecting the live stock industry have, in the light of development, proved to be accurate, Largely as the result of an enquiry into the "Dairy Industry" by the Economic and Finance Committee, definite progress has been made. Government has undertaken to provide "Cold Storage" at the Port at a capital cost estimated not to exceed £ 15,000, and Dairy Farmers are taking steps to organise the establishment of two additional Butter Factories on a co-operative basis. As the whole question is dealt with comprehensively in the Dairy Industry Report of that Committee, further reference in this Report appears unnecessary.

Already there is a surplus of dairy products. In 1924 there was an increase in the exports of Butter amounting to 55,700 lbs., but that of Cheese was about 5,000 lbs. less. Satisfactory progress in the essential improvement of the dairy cow threatens to be arrested on account of the shortage of well-bred bulls for the grading up of herds,—particularly on dairy lines. The loss of a supply of bulls from the Government Farm at Naivasha, since it was closed down in 1922, is now being seriously felt by breeders.

Importations.—The importations of pure-bred cattle for the last two years are as follows:—

1923.			
Shorthorn Bulls	...	3	Shorthorn Cows & Heifers 2
Friesland Bulls	...	15	Friesland Cows & Heifers 6
Total Bulls		18	Total Cows & Heifers ... 8
1924.			
Shorthorn Bulls	...	11	Shorthorn Cows & Heifers 13
Ayrshire Bulls	...	2	
Polled Angus Bulls	...	2	
Swiss Bulls	...	2	
Friesland Bulls	...	2	
Jersey Bulls	...	2	
Total Bulls		21	Total Cows & Heifers 13

These cattle were imported from England, Australia, and South Africa. It is regretted that breeders have not imported pure bred females in larger numbers, in order to meet the needs of the country in pure-bred bulls.

The Veterinary Adviser was deputed to visit the Argentine, to enquire into the Meat Industry. Later he went on a second Mission to England, to secure the establishment of an export trade in meat and meat products from East Africa, but it is regretted that no tangible results are to be seen. The position is that fresh capital is not attracted to a new country of production under existing conditions of more than abundant supplies fetching low prices and with idle meat factories and cold storage works. It is seen that, even were a Company prepared to enter into the business, the prices which could be offered at present would not be acceptable either to European or Native Stock Owners. With the improved purchasing power both of non-natives and natives, the demand for meat has considerably increased, and that has been attended by a clearing of surplus grade cattle for slaughter purposes, increased "killings" of native cattle and attended by an advance in prices for slaughter stock. Natives in particular are increasing their consumption of meat to a large extent. Herein it is considered lies the best market for native slaughter stock, and, with a view to improving the nutritive value of their diet, natives should be encouraged to eat more meat. A step in that direction is the inclusion of a regular meat ration in the diet of native workers on public works and on estates. Meat is now being exported to Uganda for supply both to Europeans and Natives. The extending cultivation of land in the settled areas, and the transport of an increased tonnage of crops to rail, has necessitated the supply of

an additional number of draught oxen, chiefly obtained from the Native Reserves. That, combined with an antipathy on the part of native owners to sell their cattle, even when surplus to their requirements, has caused the price of draught oxen to advance to a figure twice to thrice their value for any other purpose.

A large increase in the export of live cattle, sheep, and goats,—chiefly from coastal districts to Zanzibar,—is noted. Prior to 1922 the numbers were insignificant; for the last two years the numbers and values were as follows.—

			Number.		Valued at.	
			1924.	1923.	1924.	1923.
Cattle	...	...	4,195	2,052	£15,364	£8,278
Sheep & Goats	...	...	19,530	15,777	9,919	7,820

The export of wool has remained constant at between 4,500 and 5,600 cwts. during the last three years, but, with the grading up of native sheep with the use of Merino Rams, and the development of good sheep land—particularly in Laikipia and West Kenya—an increase in wool production should shortly be shown. During the last two years 595 sheep have been imported,—chiefly Merinos from Australia and South Africa, and a number of Rams, chiefly Grade Merinos,—are supplied locally from flocks established some years ago.

A decrease in the number of pigs is recorded,—the total number having fallen by 1,452 as compared with the previous year, but it appears to be just sufficient for the supply of bacon pigs and porkers required to meet the local demand for bacon and ham. Largely on account of difficulties in the absence of cold storage, and the drop in the value of bacon on the home markets, the export of bacon has not been found profitable, and it has practically ceased, but, with the growth of mixed farming, and attention to dairying, pig keeping on extended and improved lines is likely to follow, also progress in the Bacon Industry.

A precis of the Reports of the Veterinary Department and of Officers—in—charge of different Branches in the Department are given hereunder.—

VETERINARY DEPARTMENT.

ADMINISTRATIVE AND EXECUTIVE DIVISION.

The advancement of Major W. Kennedy, D. S. O., who had been Chief Veterinary Officer for a number of years, to the post of Director of Veterinary Services, Sudan, was well deserved, for that Officer had rendered valuable service, and had shown ability and judgment in dealing with Veterinary matters in the Colony.

The staff was almost up to full strength during the year, and the Department was thus in a position to perform a great deal of service.

The total expenditure for the year was £30,564, and revenue (including charges for Serum issued from the Veterinary Laboratory) amounted to £11,772. The increase in revenue is due chiefly to improved demand for “trade” stock, arising from the development in alienated areas; also to inoculation services in the native reserves.

Noteworthy features of the Veterinary position during the year were the large increase in the number of outbreaks of Rinderpest, chiefly in the Trans Nzoia and the Plateau, to be accounted for by surreptitious movement of cattle from the Native Reserve to European-owned farms; the recognition by natives, particularly in North Kavirondo, of the value of Rinderpest immunisation by inoculation, and their readiness to pay the fees; the success of an effort on a large scale to arrest heavy losses of cattle in Samburu Reserve on account of Pleuro-Pneumonia, and to protect them by vaccination from infection at least for a time; the increased use of Quarantine Stations whereby cattle can be moved with safety to meet the increasing demand for stock for draught and slaughter purposes; and, finally, the large quantity of Pleuro-pneumonia Vaccine issued free.

A Select Committee of Legislative Council reported upon proposals submitted by the Hon’ble Acting Chief Veterinary Officer, and recommended that a special service, consisting of a mobile unit, should be established for the inoculation of cattle against Rinderpest in the “settled” areas,—that service to provide means for educating natives as to the value of inoculation methods, and to train them for further duty in the reserves. The scheme also includes a Central Veterinary Training Depot, in connection with which further proposals are to be considered.

In the light of experience, it is seen that certain difficulties in connection with the Rinderpest inoculation might be minimised if staff were set aside to concentrate their attention upon that work, and it is hoped that the occasional mishaps—accompanied by unusually high mortality—may thus be avoided.

The following statement shows the number of outbreaks of the three most serious diseases which occurred in “settled” areas during the last three years:—

	1922.	1923.	1924.
Rinderpest (No. of farms infected)	14	38	211
Pleuro-pneumonia (No. of outbreaks)	7	4	13
East Coast Fever (No. of outbreaks in “clean” areas)	12	6	19

The cause of the increase in Rinderpest outbreaks has already been referred to; that concerning Pleuro-pneumonia is also to be accounted for by the unauthorised movement of cattle from infected native reserves; of the 19 outbreaks of East Coast Fever, eleven occurred in the sub-districts of Solai and Mereroni—where attempts had previously been made, against natural conditions, to maintain them as “clean” areas.

Rinderpest.—In North and Central Kavirondo 1,528 outbreaks were recorded among 28,305 head of cattle. Of these 6,707 head became infected—chiefly young stock—and 4,445, or approximately 60 per cent of the infected stock, died. It is hoped that, with the change of attitude of these natives towards inoculation, and with an extension of Veterinary services such heavy losses will be prevented. During the year 59,149 head of cattle, the property of farmers also of “traders” in stock purchased chiefly in Native Reserves, were double inoculated against Rinderpest on payment, and the mortality was approximately 2 per cent. Corresponding figures for 1923 and 1922 were 20,649 and 13,130 respectively.

Pleuro-Pneumonia.—There has been no material alteration in the position during the year, either in native reserves or in “settled” areas. Through the safeguards adopted by quarantine and prohibition of movement from infected centres, extensive spread of the disease is prevented, *e.g.* the Akamba and North Kavirondo Reserves have been kept free, although adjoining areas are heavily infected. No less than 92,674 head of cattle in the Samburu Native Reserve were vaccinated with entirely satisfactory results, and the service was highly appreciated by the owners. The free issue of Pleuro-pneumonia Vaccine

has undoubtedly greatly assisted in preventing the spread of insidious disease. During the period under review no less than 341,345 doses were thus issued from the Veterinary Laboratory.

East Coast Fever.—There has been no marked change in the position. After giving full and careful consideration to what was admittedly a difficult case, it was decided to remove the areas of Solai and Mereroni from those designated as "clean." While the decision may appear to be a retrograde step, approached from the point of view of a few individual farmers in those areas who are breeders of cattle, it was seen that the existing conditions could not be maintained, and that it was in the general interests of the vast majority that the alteration should be made. Reference is made under Veterinary Research to the promising experiments now being made in connection with the immunisation of cattle against East Coast Fever.

Foot & Mouth Disease. After consultation with those representing live stock interests, and, after weighing up the advantages and disadvantages attending the quarantining of infected areas, and having regard to the impracticability of attempting to control effectively the spread of the disease by restriction of movement, it was decided to remove the restrictions. The number of outbreaks has not increased.

Other Diseases.—Of Anthrax 50 outbreaks were recorded as against 27 in 1923. In 1924, 9,112 cattle were vaccinated, as compared with 6,417 in the previous year. The increase in the number of outbreaks recorded does not necessarily mean a spread of the infection; it is not unlikely in this and in other cases to be due to better reports. The Medical and Veterinary Departments co-operate in order to guard against conveying the disease by means of meat and milk.

In regard to "Trypanosomiasis," extensive areas of the Colony are included in the "Tsetse Fly" Belt, but a campaign calculated to exterminate the pest, and to permit of stocking the land, must await extensive entomological and veterinary surveys and further research work, which are altogether beyond the staff and other resources of this Colony or any individual territory concerned. In connection with this disease, the following pertinent remarks are quoted from the report of the Chief Veterinary Officer:—

"Extensions of this disease have continued to be detected in hitherto clean areas. The duration of the outbreaks depend on the cause. Outbreaks due to infected animals being taken to areas free from Tsetse Fly are not difficult to deal with, but may prove expensive to the owner. The risk of spread in such cases has been negligible. Other outbreaks in fly free areas due to game, usually buffalo, bringing the fly with them from Tsetse Fly infested country, and encroaching on pasture used by

"stock, are dealt with by the Game Department allowing unlimited shooting in such areas with a view to exterminating the offenders."

Reports of mortality from Redwater and Gallsickness appear to be increasing among young stock. A vaccine is issued by the Veterinary Laboratory to prevent such losses on farms where regular dipping is not practised. Use has been made of the facilities afforded for the immunisation of imported cattle against these diseases, and most satisfactory results have been obtained.

With the extension of stock-breeding more cases of "Black-quarter" are reported; 25,260 doses of Black-quarter Vaccine were issued during the year.

All quarantines in respect of Tuberculosis were raised after a few outbreaks had been dealt with by the use of Tuberculine test.

Among sheep, mortality is chiefly due to parasitic diseases. To combat them, the remedy, of which 287,000 doses were issued from the Veterinary Laboratory, should be more extensively used.

Quarantine Stations. Every effort has been made to meet the increased demand for stock for draught and breeding purposes by providing stations through which they could be safely moved and previously inoculated, in order to prevent the spread of disease. For that purpose seven stations were in use to serve different parts of the country.

A perusal of the annual reports of the Veterinary Department will indicate the difficult task which is presented in dealing with veterinary services in both native and non-native areas, and, to enable stock breeding to progress and the development of the country to proceed, constant vigilance is necessary, together with a helpful attitude towards the needs of those who are directly concerned and interested in carrying on the business of the country.

DIVISION OF VETERINARY RESEARCH.

During a period of leave the Chief Veterinary Research Officer paid a visit to the United States of America, to confer with Veterinary Pathologists, also to enquire into "Swine Fever" problems, and to study methods of Sera and Vaccine production. He also spent some time at the Veterinary Research Institute at Onderstepoort, South Africa, where diseases—common to both South and East Africa—are investigated, and dealt with on the most scientific lines ; in particular, he was made conversant with the work previously done on East Coast Fever immunisation, and conducted preliminary Swine Fever experiments.

The total expenditure for the year was £20,766 and the revenue directly secured amounted to £6,843, exclusive of anti-Rinderpest Serum of the value of £12,345, issued to the Executive Division for use in the field, and shown under "Testing, Dipping, Fees, &c." Other products valued at £5,227, chiefly Pleuro-pneumonia Vaccine, were issued free of charge.

PREPARATION OF LABORATORY PRODUCTS.

The following table shows the amount of Serum, Vaccines, &c., prepared and issued during the period under review:—

Product.	Quantity on hand 31/12/23.	Prepared by the Laboratory during the year.	Issues for year.	Returned to Laboratory.	Written off.	Balance on hand, 31/12/24.
Anti-Rinderpest Serum	...	5,915,250	8,791,450	1,972,580	...	2,428,080 c. cs.
Blackquarter Vaccine, 1st	...	4,770	25,260	850	4,770	2,560 doses
" " 2nd	...	4,610	25,260	850	4,610	2,560 "
Anthrax Vaccine, single	...	3,045	...	...	...	3,045 "
" " 1st of double	...	38,760	16,510	2,940	23,460	10,730 "
" " 2nd "	...	23,820	16,750	2,780	18,400	10,730 "
Bluetongue Vaccine	...	2,820	2,200	...	...	14,316 "
Pleuro-pneumonia Vaccine	...	341,345	341,345	...	...	...
Sheep Pox Vaccine	...	19,021	19,021	...	...	...
Contagious Abortion Vaccine	...	506	506	...	...	...
Trypanblue Canine	...	679	645	...	...	...
" Bovine	...	342	236	5	...	110 "
Colon Bacillosis Vaccine	...	1,158	8,691	66	...	122 "
Kikuyu Fowl Disease Vaccine	...	...	7,385	...	...	1,235 "
Ulcerative Lymphangitis Vaccine	...	2,525	890	...	...	...
" " (defatted)	...	344	282	...	1,635	c. cs.
Wireworm Remedy	...	311,600	287,000	...	...	62 course
Redwater and Galisickness Vaccine	...	...	153	...	...	40,200 doses.
	...	...	...	...	...	...

The total value of the above-mentioned issues of Sera and Vaccines is shown under Finance.

No less than 9,660 specimens were submitted for examination, an increase of 3,107 over the previous year. These included 5,548 blood samples submitted to the new Serum diagnosis for Bovine Pleuro—pneumonia.

Cattle Diseases.—Further research work done on the serum diagnostic test resulted in a simplification of the method, but the test remains one necessitating very careful technique, and, without an increase of staff, the number of Sera which can be dealt with is limited.

In connection with Rinderpest immunisation, Research was continued to ascertain whether the utilisation of Rinderpest virus of sheep could be successfully substituted for Rinderpest blood of a bovine, the object being to remove the risk of transmitting Redwater and Gallsickness in certain circumstances. As a result the substitution of Rinderpest of the sheep is not recommended, excepting perhaps in exceptional cases.

Experiments which, if successful, would prove to be of great value and far reaching importance, were made on the immunisation of susceptible grade and other cattle against East Coast Fever by means of inoculation of infected spleen or gland. So far, the results are promising, including those obtained after exposure on highly infected pasture. Three per cent only died of East Coast Fever, consequent on inoculation. With deaths from other causes the total death rate was approximately 9 per cent from inoculation. Upon exposure to natural infection, to determine the degree of immunity conferred, 18 per cent died of East Coast Fever, whilst 20 per cent contracted the disease and recovered. For further particulars of these exhaustive experiments reference should be made to the report of the Chief Veterinary Research Officer.

Other diseases investigated were Mastitis and Sterility, and "Nakurutitis".

Diseases of Sheep.—Investigations into the occurrence of intestinal worms and other Endoparasitic affections were continued. Blue—tongue, Variola, Sheep Pneumonia, all received attention.

Diseases of Equines.—Lymphangitis,—Experiments with a defatted Vaccine were not encouraging, whilst the use of Na. K. Bi. Tartarate injection is of doubtful value.

Swine Fever.—Supplies of virus and anti-serum were secured from Ames, U. S. A., and after several lots were found to be avirulent, one virulent consignment arrived. It was found that American Hog Cholera Anti-serum did not confer immunity against East African virus. Pigs immune to American Swine Fever are not resistant to the East African virus.

Attenuation experiments with East African virus were carried out, but with no practical result, indicating the value of an attenuated virus.

Poultry.—It was demonstrated that local grade birds were more susceptible to the vaccination for Kikuyu Fowl Disease than imported birds.

A Reference Library, containing the most recent works and other literature dealing with animal diseases is of the first importance to a Research Institute, and, while books and scientific papers and journals are obtained, it is to be regretted that, on account of the shortage of staff, it has been impossible to have them card indexed to facilitate ready reference. For the same reason, little progress has been made in the Museum, where pathological specimens should be preserved and recorded for reference, educational, and demonstration purposes.

SUNDRY.

A substantial increase in the volume of correspondence is noted.

Ten acres of land were surrendered for the establishment of a Native Industrial Training Depot.

Sixty acres of land were fenced off with a double fence for the experimental work on East Coast Fever.

Feeding stuffs, such as Maize, Offals, Lucerne Hay, Cotton Seed, and Linseed, &c., are purchased in large quantities,—chiefly for the nutrition of the serum makers. A limited quantity of fodder, such as ensilage and lucerne hay, is produced from the Laboratory Farm. The Live Stock on hand on 31-12-24 were as follows.—

Horses	...	...	...	12
Mules	...	...	...	33
Cattle (all ages)	...	...	...	721
Sheep	...	...	...	48
Goats	...	...	...	15
Pigs	...	—	...	71

The only buildings erected during the period under review consisted of.—

“Artisan’s” Quarters,

New Quarters for Native Labourers.

An Isolation House for East Coast Fever Experiments.

All this work, as well as alterations, repairs, &c., were carried out by the Laboratory Staff, by whom was also undertaken the installation of new laboratory plant and improvements and extensions of the supply and sanitary system.

ENTOMOLOGY.

2,654 miles were travelled by the Entomologist on duty.

Routine Work.—A considerable increase in the routine work over 1923 is reported, correspondence alone having increased by 60 per cent. 1,063 packages of imported seeds and plants were examined at the Post Office and Railway Station. 509 applications for Permits to import plants and seeds were scrutinised, passed, or amended. 184 specimens of insects, damaged plants, &c., were examined, and reported on for growers.

The insect collection has been added to, many specimens collected being previously unrepresented in the British Museum, and a few are new to science.

Insect Pests of the Year.—The report of the Entomologist should be read by those interested in the crop pests of the Colony.

Coffee Mealy Bug spread to an alarming extent during the first eight months of the year, and caused considerable loss of crop. This pest has been closely investigated, and efforts are being made to control same biologically and in other ways. To this end a colony of the Ladybird "*Cryptolamus montrouziezi*" (Muls) has been imported from South Africa. Arrangements have also been made for the introduction of the Sicilian Mealy Bug Parasite "*Tanamastix abnormis*" (Girault).

Experiments were made upon the heating of maize to destroy insect life.

CHEMISTRY.

A Branch to deal with Agricultural Chemistry was instituted at the beginning of the year, taking over all the agricultural chemical work that the Government Analyst previously performed. At first the Chemical Officer worked in the Laboratories of the Government Analyst, but later moved to the Scott Agricultural Laboratories, where chemical laboratories were equipped during the year.

Notwithstanding the difficulties under which work was performed, 544 samples were analysed, and reports on samples issued. Most of the work consisted in routine analyses of dip samples, other samples forming a seventh of the total received. In addition, 676 letters were dealt with. A new appointment of Agricultural Chemist was made, and that Officer commenced his duties in December, 1924.

MYCOLOGY.

53 days were spent by the Mycologist in travelling on duty, during which about 4,000 miles were covered and 61 visits to farms were made.

During the year the Coffee Berry Disease was proved to be due to a fungus which is considered to be a strain of *Colletotrichum Coffeanum*, differing from that which is common throughout the country as the cause of Brown Blight and other minor coffee maladies. Spraying experiments against the disease have given promising results.

A destructive disease affecting maize ears was under investigation, and, so far, the results obtained indicate that it is identical with an ear rot of Maize well known in America, and due to the fungus *Gibberella Saubinetii*.

Other investigations included a disease of coconuts, causing splitting of the husks; a root disease of apple trees; and a damping-off of coffee seedlings.

Enquiries dealt with regarding plant diseases covered a range of 28 different hosts. Information was also given on a number of purely botanical subjects.

Several diseases of varying economical importance were recorded for the first time for Kenya in 1924.

GRADER AND INSPECTOR.

During the period under review the Plant Import Inspector was absent on leave, and, as no Officer was available for that inspection service at Mombasa, all inspections of seed and plants had to be made by the staff at Nairobi. The inconvenience which some Importers may have suffered as a consequence is regretted, but the staffing of the Department did not permit of any other arrangement being made.

859 packages of Imported Seeds, Plants, and Fruit Trees, of the value of Shs. 44,529/- were inspected. In addition, 34 packages, valued at Shs. 1,906/-, were passed in transit to Uganda.

Services for the grading of maize, and the inspection of beans and peas for export, were maintained. The former has been dealt with under the head "Maize"; 65 certificates were issued for 18,618 bags of Beans and Peas, the fees amounting to Shs. 1,312/-.

Including £2,069 derived from Maize Grading fees, the total revenue collected for grading and inspection services amounted to £2,134.

ECONOMIC SURVEYS, &c.

With the provision of loans for Capital Expenditure on new railway lines, and, in order to investigate those areas where a case for branch line communications appear to justify the enquiry, economic surveys have been carried out. Reports dealing with the Lower Molo and Solai areas, also with the area to be served by a projected line to Thompson's Falls, have been submitted. Similar surveys have yet to be made for a number of other proposed branch lines. The Deputy Director has also reported upon the suitability of a large extent of country for Asiatic Settlement, and has devoted much time to land questions in association with the Lands and Native Affairs Departments. These important services are very properly demanded of this Department, but, staffed as it is at present, they can only be rendered with difficulty, and at a sacrifice of other and pressing work.

Labour.—The following comparative table of average number of units of native labour employed monthly shows an increase of 16,136 labourers (men, women, and children) for the year ending June, 1924 :—

Year.			Men.	Women.	Children.	Total.
1919-20	...	...	45,005	3,917	4,787	53,709
1920-21	...	...	55,939	4,911	6,539	67,388
1921-22	...	...	51,753	4,261	5,935	61,649
1922-23	...	...	54,406	6,609	9,942	70,957
1923-24	...	...	66,993	8,316	11,784	87,093

The decrease in 1921-22 is probably to be accounted for by the depression which then existed, resulting in a reduction of expenditure, and the arrest of development of a kind which did not give an immediate return. It is considered also that better use is made of the labour than was formerly the case, due to economy in management, and increased experience in the handling of unskilled labour. There is also a steady increase in the efficiency of the labourers.

Despite the increase shown above, there occurred an acute shortage of labour from about September to the end of the year, and only with real difficulty were farmers able to carry

on the work of their holdings. In many cases crop production suffered, and work of development essential for future production was seriously impeded.

Land Settlement.—The number of occupiers of land has increased during the year by 249, and particularly towards the close of the year many people arrived in the Colony with a view to securing land and farming it.

Land has exchanged hands at advancing prices. In some cases owners are holding out for high prices, but, if care be exercised in selection, highly productive land can be bought at favourable rates.

Agricultural Shows.—A highly successful Show was again held at Nakuru. Notable features were the improvement in the quality of the live stock, and the excellent displays in the section for District Exhibits, proving the capacity of the Colony for producing economic crops of good quality in great variety.

The Grant-in-Aid of £500, made prior to 1922, to the Agricultural and Horticultural Society of Kenya has been restored.

East African Stud Book.—The number of entries forthcoming for the third volume was insufficient to justify the expenditure on its publication in 1924, but compilations are being made for the next volume to be published in 1925.

There stands to the credit of the Stud Book Account under the Agricultural and Horticultural Society a sum of £212.

BRITISH EMPIRE EXHIBITION—1924.

In no small degree did this Department, through its staff, contribute towards the display made by Kenya, which consisted very largely of agricultural exhibits. High appreciation of the attractive character of that display, coupled with the completeness of its presentation of the chief agricultural industries, was expressed, and many gave the Kenya Court a foremost place in the category of Crown Colonies. In no other way could the resources of the Colony have been so prominently brought before so large a number of people, and the effort is calculated to have given the Colony a high reputation. As a result, there have undoubtedly been attracted to Kenya a large number of new settlers and capital for the development of its resources, while its products have become better known to a wider field of traders and merchants.

LIBRARY and PUBLICATIONS.

With such funds as are available, an effort is made to build up a useful agricultural library. Most of the books therein are available on loan on payment of a Deposit Fee of Shs. 30, and some use has been made of the facility offered.

The following Reports, Articles, &c., have been published, and distributed, during the year:—

Annual Report of the Department of Agriculture for 1923.

Fifth Agricultural Census Report for the year ended 30th June, 1924.

Meteorological Report for 1922-23.

Report of Proceedings of the Second Maize Conference, 1924.

Kenya Cotton Rules, 1924.

Short Review of Agriculture in Kenya, by Hon. Mr Alex. Holm, M.L.C.

Coffee Growing in Kenya, by F. H. Sprott.

Maize in Kenya, by J. J. Toogood.

Sisal in Kenya, by E. D. Rutherford.

Sheep Scab : Psoroptic Scabies of the Sheep (Division of Veterinary Research—Bulletin No. 5—1924).

Variola Ovina—Sheep Pox. (Division of Veterinary Research Bulletin No. 6-1924).

Vaccination of Sheep against Variola Ovina—Sheep Pox. (Division of Veterinary Research).

Coffee Mealy Bug (*Pseudococcus Citri*, Risso); by T. J. Anderson, M.A., B.Sc., &c., Entomologist.

Notes on the Biological Control of the Mealy Bug; by T. J. Anderson, M.A., B.Sc., &c., Entomologist.

List of Blood Sucking Flies and their Allies in Kenya; by T. J. Anderson, M.A., B.Sc., &c., Entomologist.

Ectoparasites recorded from Kenya and their Hosts; by T. J. Anderson, M.A., B.Sc., &c., Entomologist.

Preparation of "Carbide" Mixture Spray.

PERSONAL.

To the Deputy Director (Mr E. Harrison) credit is due for the manner in which he discharged the duties of Acting Director during the period I was absent from the Colony on special service. The demands upon his services, extraneous to ordinary Departmental duties, were heavy, but with the keenness and devotion to duty—particularly of the staff at headquarters—the administrative work was carried out without serious delay during his frequent and prolonged absences on duty.

While engaged on special service in connection with the British Empire Exhibition, I took the opportunity of enquiring into many questions connected with the trade in agricultural products exported from this Colony, and in many directions attended to its interests.

The more important of my public duties have covered services in the following capacities during the period under review:—

Member, Legislative Council; Member, Inter-Colonial Railway Council; Member, Economic and Finance Committee; Member, Central Advisory Committee on European Education; President, Kenya Empire Exhibition Council; Exhibition Commissioner for Kenya (1924); President, Agricultural & Horticultural Society of Kenya; and Chairman, East African Stud Book.

These services are mentioned only in order to indicate the demands properly made upon the services of the Head of a Department of Agriculture in a Colony where Agriculture is of the greatest and far-reaching importance.

DEPARTMENTAL REPORTS.

Submitted with this report are included the following appendices:—

- (a) Staff changes and new appointments in 1924.
- (b) Staff at December 31st, 1924.
- (c) Annual Report of the Chief Veterinary Officer.
- (d) Annual Report of the Chief Veterinary Research Officer.
- (e) Annual Report of the Agricultural Chemist.
- (f) Annual Report of the Entomologist.
- (g) Annual Report of the Mycologist.
- (h) Annual Report of the Plant Breeder.
- (i) Annual Report of the Senior Coffee Officer.
- (j) Annual Report of the Flax Officer.
- (k) Annual Report of the Inspector of Plantations.
- (l) Annual Report of the Grader and Inspector.

NAIROBI:

(Sgd.) ALEX. HOLM,

May, 1925.

Director of Agriculture.

APPENDIX "A."

STAFF.

The principal staff changes and new appointments during the year under review were:—

Mr. W. H. Boedeker, Agricultural Supervisor, resigned his appointment in July.

The following Officers were appointed:—

Mr. M. H. Fox, A.I.C., B.Sc., Chemical Officer, transferred from the Chemical Research Dept., 1st January.

Mr. N. D. Spranger, Agricultural Supervisor, 14th March.

Mr. R. J. Lathbury, M.A. (Camb.), Senior Agricultural Supervisor, transferred from Tanganyika Government Service, 24th June.

Mr. H. Wilkinson, A.R.C., Sc., F.E.S., Inspector of Plantations, transferred from Uganda Government Service, 1st July.

Mr. A. G. Bailey, Senior Agricultural Supervisor, 24th July.

Mr. V. A. Beckley, M.D., Agricultural Chemist, 9th December.

2. VETERINARY ADMINISTRATIVE AND EXECUTIVE DIVISION.

Major Kennedy, D.S.O., Chief Veterinary Officer, left the Colony on transfer on 28th June, having been appointed Director of Veterinary Services to the Sudan Government.

Lieut.-Col. A. G. Doherty, M.C., Deputy Chief Veterinary Officer, acted as Chief Veterinary Officer for the remainder of the year.

Capt. O. Dixon, M.C., Senior Veterinary Officer, acted as Deputy Chief Veterinary Officer.

Mr. E. A. Wilshaw, M.R.C.V.S., was engaged locally on a temporary appointment on 1st August.

3. DIVISION OF VETERINARY RESEARCH.

Mr. W. Kearney, Assistant Chief Veterinary Research Officer, and Mr. J. Ford, Laboratory Assistant, left the Colony on transfer to the Nigerian Veterinary Department on 25th May.

Mr. W. Kearney acted as Chief Veterinary Research Officer until the 30th January.

Mr. T. C. Bradshaw acted as Assistant Chief Veterinary Research Officer during the same period.

Mr. S. H. Whitworth acted in the post of Assistant Chief Veterinary Research Officer from 25th May.

VETERINARY.

1. Administrative & Executive Division.

- Ag. Chief Veterinary Officer : A. G. Doherty, M.C.,
M.R.C.V.S.
- Ag. Deputy Chief Veterinary Officer : H. H. Brassey Edwards,
M.R.C.V.S.
- Senior Veterinary Officers : O. Dixon, M.C., M.R.C.V.S.; R.
C. Wheeler, M.B.E., M.R.C.V.S.
- Veterinary Officers : A. W. Carter, M.R.C.V.S.; M. H. Reid,
M.R.C.V.S.; J. T. C. Bradshaw, M.R.C.V.S.;
G. B. Purvis, M.R.C.V.S.; R. S. Little,
M.R.C.V.S.; D.V.S.M.; R. L. Creery,
M.R.C.V.S.; W. G. Emerson, M.R.C.V.S.;
E. J. Mulligan, M.R.C.V.S.; E. A. Wil-
shaw, M.R.C.V.S.
- Stock Inspectors : H. G. Ulyate, D. Wyartt, R. A. C. Campbell,
W. L. Lewis, G. White, H. E. Evans,
J. Mackay, L. E. Smith, F. G. Chapman,
H. Thorne, S. F. Saunders, T. Harris,
F. T. O'Meagher, J. F. Greig,
A. E. Hudson, J. E. McDonogh,
C. B. Jolley, P. H. Poolman, H. J. Vernon.
-

2. Division of Veterinary Research.

- Chief Veterinary Research Officer : J. Walker, M.R.C.V.S.
- Ag. Asst. Chief Veterinary Research Officer : S. H. Whitworth,
M.R.C.V.S., B.V.S.
(Melb.), D.V.M.
(Zurich).
- Research Officer : Vacant.
- Laboratory Superintendent : A. Walker.
- Laboratory Assistants : J. T. Schultz, H. J. Gray, J. R.
McQueen, J. S. McDonald.
- Overseer : J. Burton.
- Yard Foreman : J. Forsyth.
- Clerks : W. White, A. E. Johnstone, A. J. Kemp.
- Mechanic : O. Stenmark.
- Storekeeper : J. Scott.
- Assistant Storekeeper : G. W. Clochley.
- Junior Clerk : Miss N. Judd,

APPENDIX "B."

STAFF LIST

OF

DEPARTMENT OF AGRICULTURE.

(AS AT DECEMBER 31ST, 1924.)

Director:

Alex. Holm, F.H.A.S., M.B.A.S.E., S.E.A.C., (Dip Hons).

Deputy Director:

E Harrison, M.S.A., B.Sc., N.D.A. (Hons).

Administrative and General:—

Statistical Officer: L. D. Carpenter, P.A.S.I.

Accountant:— H. S. Land.

Office Superintendent & Asst. Accountant:—A. C. Hunter.

Clerks: R. Abram R. F. Dalziel-Armstrong, J. E. Harrison,
R. A. Hawkins, F. Parker, L. Myers.Junior Clerks: F. W. Evans, F. E. K. Barratt (Miss), B. J.
Ratcliffe, K. Rhys Maitland, F. Rhys Maitland,
B. A. Pickering R. N. Noble, A. C. E. Gaitskell.

Lady Typist: Mrs M. A. Carr-Hole.

Entomologist: T. J. Anderson, M.A., B.Sc., (Hons. Edin.), F.Z.S.,
F.E.S.

Mycologist : J. McDonald, D.F.C., B.Sc., (Hons).

Agricultural Chemist: V. A. Beckley, M.D.

Chemical Officer: M. H. Fox, A.I.C., B.Sc.

Plant Breeder: G. J. L. Burton, M.C., B.A.

Senior Coffee Officer: A. D. Le Poer Trench, (Dip. O.A.C.)

Inspector of Plantations: H. Wilkinson, A.R.C.Sc., F.E.S.

Flax Officer: G. M. Hamilton.

Graders and Inspectors: C. C. T. Sharp, A. R. Teague.

Senior Agricultural Supervisors: P. Booth, N.D.A., R. J. Lathbury,
M.A., A. G. Bailey.Agricultural Supervisors: F. B. L. Butler, F.L.S., F.R.H.S.,
T. M. W. Sheppard, B. H. Frowd,
A. S. Hartley, W. Lyne Watt,
N. D. Spranger.

APPENDIX "C."

VETERINARY DEPARTMENT.

ANNUAL REPORT

OF

THE CHIEF VETERINARY OFFICER

FOR

THE YEAR ENDING 31st DECEMBER, 1924.

STAFF CHANGES.

Major Kennedy, D.S.O. Chief Veterinary Officer, having been appointed Director of Veterinary Services to the Sudan Government, left the Colony on transfer on the 28th of June, 1924.

Lieut. Colonel A. G. Doherty, M.C. Deputy Chief Veterinary Officer acted as Chief Veterinary Officer for the remainder of the year.

Captain O. Dixon, M.C., Senior Veterinary Officer, acted as Deputy Chief Veterinary Officer.

Mr. E. A. Wilshaw, M.R.C.V.S. was engaged locally on a temporary appointment to fill a vacancy on 1st August, 1924.

GENERAL.

In dealing with animal diseases in an Annual Report so that the information contained may be of value not only as a record of work accomplished during the period under review, but also as a guide in the development of industries connected with live stock, it is necessary, owing to the nature of our stock epidemics due to the natural immunities to disease as well as to the application of modern methods of conferring immunity, to depart from the stereotyped formulæ usual in such reports on the stock diseases of more civilised countries. I have endeavoured, under the different headings, to indicate how our position in this respect affects the live stock outlook in this Colony.

A report of mortality in an outbreak of rinderpest in a herd where only 5% of the stock are susceptible would not convey a true impression any more than reported deaths from East Coast

Fever represent the widespread incidence of the disease over large areas of the Colouy with an immunity amongst native stock in certain areas the details of which have not yet been closely investigated.

It will be observed that outbreaks of rinderpest in the alienated areas increased to two hundred and eleven as against thirtyeight in 1923. The cause of this large increase is dealt with under the head of Cattle Movement in this report.

The position with regard to pleuro pneumonia did not improve during the year, and eight additional quarantines were imposed on farms in the alienated areas. The cause again was illicit movement of stock from the infected native reserves.

The vaccination to safeguard stock is a simple operation easily carried out by stock owners, and vaccine is issued free by Government.

The Staff inoculating against pleuro pneumonia in the Samburu Native Reserve by energetic work amongst the herds that had not contracted the infection limited the spread of the disease to a great extent, and recent reports are very favourable with regard to the disease position, but the cattle of the reserve are reported as being in low condition owing to a large portion of the Samburu area being unsuited to horned stock.

Training of natives in detection and control of disease in the Reserves has been continued so far as circumstances admitted. It is difficult, if not impossible, to exert a sufficient measure of control of movement in the Reserves to prevent the spread of disease. It is felt, therefore, that with the large measure of support accorded to the inoculation service by the natives who have used the first Veterinary Station opened in a Reserve that immunization against disease and free movement in the native areas will not only be a more practical method of coping with preventable diseases, but should prove more acceptable to the natives and less costly to maintain.

The financial aspect of work amongst native live stock is mentioned under the heading of Native Education in this report where it will be seen that natives have been willing to spend the necessary money to obtain improved conditions for their stock once the inherent prejudice against outside interference has been broken down by educational measures.

There is a great deal of native country at present carrying stock to which it is unsuited with the inevitable result that deterioration occurs. The Samburu Reserve is an example of this. Country where excellent condition exist for sheep is being used for horned stock which cannot be maintained in profitable condition owing to lack of suitable pasture and water facilities.

Again many natives who lack the natural instincts of pastoralists keep large herds of cattle for social purposes. Stock under

such conditions soon decrease in size, constitution, and marketable value although possessing a very high value in the eyes of the owner. The work of the Veterinary Service during the year has been directed to providing facilities for movement of stock where indicated by trade conditions. Trade in cattle has been chiefly confined to oxen from Native Reserves where East Coast Fever is endemic. Increased areas of land going under cultivation created large demands for oxen in excess of the normal for this class of cattle, and there has been a corresponding increase in price.

Facilities for Masai natives to dispose of their surplus oxen to supply the Nairobi demand for slaughter cattle continued to exist during the year.

STOCK MOVEMENT.

The organising of movement of stock throughout the Colony with a view to preventing the spread of disease, and at the same time to allow the greatest possible latitude to stock traders and agriculturists in respect of movement of trade stock, and transporting farm produce became simplified as far as Rinderpest and Pleuro Pneumonia are concerned as the immunizing service for these diseases extended. Quarantine stations for the inoculation of cattle from native reserves have been in use at Machakos, Waterfalls, Athi River, Kibigori, Nandi, Trans N'zoia and Isiolo.

With regard to East Coast Fever the Colony is divided into two large main areas classed as infected and non-infected for purposes of movement. Cattle are not allowed to enter the non-infected area unless they possess a brand denoting immunity to East Coast Fever or have been dipped according to regulations. There are two small islands of non-infected country situated at Limuru and Upper Molo in the infected area.

Under the heading "Resident Natives Ordinance, 1918" Major Kennedy reported as follows in the last Annual Report (1923).

"It is to be regretted that the provisions of this Ordinance are not yet properly enforced in most districts in as far as they apply to the branding and checking of squatters cattle. As long as squatters cattle remain unbranded and their numbers unchecked so long will uncontrolled and illicit movements of cattle take place between the native reserves and the European owned farms on which the squatters are resident."

The position in respect of this Ordinance remained the same during 1924.

Outbreaks of disease introduced to the settled areas from the native reserves kept pace with the increased demand for Squatter labour on farms.

EDUCATION OF NATIVES.

Educational measures with a view to improving native owned stock and stock conditions have, in the initial stages, been aimed at, demonstrating to native owners that the regular high mortality in stock from disease, to which he is accustomed and accepts as inevitable, is unnecessary and that modern methods can confer the same immunity with a much smaller loss. This is especially applicable to rinderpest. Proposals for the education of natives on these lines were submitted during the year, and a beginning has been made.

Material for this demonstration system is provided at the quarantine stations where trade cattle are immunized to rinderpest and Pleuro-pneumonia before leaving native areas. These stations, hitherto situated on the boundries of the areas they serve, will be moved to central situations where they will function as combined inoculation and educational centres. Natives will be taught the technique of the immunization work in progress and will be able to observe the free movement permitted to cattle after inoculation as well as the higher value placed by traders on immune stock. One such station has been in operation since December, 1924, and at the time of writing (May 25th) it is interesting to report that approximately 25,000 head of cattle have been brought to it by native owners who have willingly paid £4,000 in fees for the service. A second station has been asked for by an adjacent Chief who has had requests from his people for similar facilities to immunize their stock against disease.

The educational proposals embraced the establishment of a Central Training Depot where selected natives from the Reserve Stations will be able to receive further training. This training centre will furnish an inoculation organisation for the immunization of stock in the alienated areas; native pupils under training will be afforded an opportunity of working amongst stock of improved types, and in an atmosphere of modern stock management. An additional sum of money has been provided for this inoculating organisation, but the site for the Central Training Depot has not yet been settled. Proposals with regard to it are before Government.

Natives trained at the Central Training Depot will be returned to their reserves where they will be employed by Government, and so serve as educational factors under the Veterinary Administration in the Native Areas.

Instruction in better methods of preparing hides has been given as far as possible, and great improvement has been effected in the quality of hides prepared under the directions of the

Veterinary Staff. Natives have taken to the erection of sheds for the shade drying of hides as soon as the better prices for hides so dried was demonstrated to them. This work will expand, and should result in a marked difference in the export values of hides.

The same remarks apply to improved methods of ghee making. Any appreciable increase in this commodity, however, must await results from educational measures on stock breeding and management.

The Veterinary Staff working in native reserves are, by virtue of their work, favourably situated to impress the value of improved stock and stock management on native owners. The first step in this direction is the castration of unsuitable males. Stock improvement in native reserves must go hand in hand with research work on our native types of stock in conjunction with close examination of pasture and water conditions in native areas.

During the year proposals were made for the establishment of a Karakul sheep industry, which is eminently suitable to our sheep owning natives.

RINDERPEST.

Rinderpest was prevalent throughout the year in all the Native Reserves, and 211 outbreaks were dealt with in the alienated areas. In order to clearly define the position with regard to this disease amongst native owned stock in the Reserves it is necessary to point out that the naturally acquired immunity which is met with amongst native owned stock is dependant on the constant presence of the disease in the Reserve. An outbreak of rinderpest at a native village rarely presents the appearance in dead and dying cattle usually associated with epidemics of this kind in as much as only the young stock usually become affected. The losses, therefore, not affecting the milking cows or marketable oxen do not convey any very great sense of loss to the primitive native owner. This process is a continual one throughout all the native areas resulting in a colossal wastage of stock from this preventable disease as the following figures show.

In North and Central Kavirondo 1,528 outbreaks of rinderpest were noted by the Veterinary Staff during the year. 26,305 cattle were involved of which only 6,707 become infected, chiefly young stock. The mortality was 4,445 head. This mortality amongst approximately twentyeight thousand cattle spread over one thousand five hundred and twenty eight outbreaks does not convey any sense of the huge wastage it

actually represents. It is the usual mortality of over 60% of the annual increase from this disease in Nyanza where the natives today own one million head of cattle. The educational work and inoculation services mentioned elsewhere in this report aim at preventing this large wastage, and the success which has attended our initial efforts in this direction is promising. If the work can advance the indications are that within a few years the present wastage of stock from rinderpest in Native Reserves will be prevented.

In areas where the disease has not been present for a period of years or in alienated areas where susceptible cattle are reared the position is different. An outbreak of rinderpest can be fatal to an entire herd.

The following is a summary of the outbreaks which occurred on European-owned farms during the year, and the figures for the previous year are also indicated.

	1923.	1924.
1. Uasin Gishu-Trans Nzoia districts...	17	102
2. Lumbwa District	...	31
3. Nairobi	9	40
4. Laikipia	1	1
5. Nakuru	...	35
6. Kisumu	11	2
	38	211

The method recommended by Government for dealing with rinderpest is that first used in the Colony by Mr R. E. Montgomery in 1912, and consists in conferring an active immunity to the disease by the simultaneous inoculation of virulent blood and anti-rinderpest serum manufactured at the Veterinary Laboratory, Kabete. This method is now generally accepted as the most efficient and cheapest known method in dealing with rinderpest. During the year 59,149 head of cattle, the property of farmers and traders, were double inoculated against rinderpest on payment, with a mortality approximating 2%. As far as we know the immunity conferred is permanent. The method, therefore is proved on economic and practical grounds.

The question of applying this service to the Native Reserves is discussed under the heading of Native Education in this report.

EAST COAST FEVER.

The position with regard to this tick-borne disease remains very much the same from year to year.

There are the large areas where the disease is endemic in which adult cattle are found to be immune. The areas classed as free from the disease have undergone a slight modification during the period under review in as much as the residents in the Solai and Meroroni districts of Nakuru area, where Agricultural interests are paramount, discovered that with increasing development which necessarily involved greater numbers of work oxen that the incidence of East Coast Fever in those two districts was larger than it was supposed to be, and increasing numbers of isolated quarantines on roads and farms was making transport of produce, and the obtaining of oxen for farm work, so difficult as to create an almost impossible situation. It was considered that the most suitable policy to adopt was to include both districts in the area classed as endemic, and to petition Government to alter the boundary accordingly. After meetings and discussions on the subject this has been done.

The numbers of outbreaks reported in the areas other than endemic were 19, of which 11 occurred in the Nakuru district, principally Solai and Meroroni.

An invitation from the Government of S. Rhodesia to send a Delegate to a Conference at Bulawayo to discuss East Coast Fever, and measures to control it, was received towards the end of the year. It is to be regretted that time did not admit of making the necessary arrangements for this to be done.

A large proportion of the samples of Dip received were dangerously incorrect, over 20% some over 100% over strength whilst many were well below 20% too weak, as evidenced by the following figures kindly supplied by the Agricultural Chemist.

Class.	Error in Strength.	1921.	1922.	1923.	1924.
Sufficiently correct...	Not exceeding 10%	46.5	41.68	42.30	38.4
Seriously wrong ...	11% to 20% ...	25.7	26.61	25.54	24.6
Dangerously wrong	Exceeding 20% ...	27.8	31.71	32.16	37.0
Total number of Samples analysed ...		705	511	513	443

As will be seen from the report of the Chief Veterinary Research Officer research work is being carried out with a view to elucidating the problems in connection with this disease,

especially with regard to the immunity enjoyed by the hundreds of thousands of cattle living on the endemic areas in the Colony.

An educational policy in native Reserves is aimed at by the Veterinary Service, which will afford an opportunity to closely study the endemicity of East Coast Fever in certain areas, and result in the distinctive branding of oxen in those areas for use in infected East Coast Fever districts. This special branding of cattle believed to be immune to the disease has been in vogue for some years. The extension of the service will assist materially in limiting the further spread of this disease on transport routes.

CONTAGIOUS BOVINE PLEURO PNEUMONIA.

The position with regard to this disease has not been altered materially in the Native Reserve during the year. The existing quarantines were maintained, and have proved an efficient safeguard against any extensive spread of the disease. The Akamba and North Kavirondo Reserves have kept free from the infection, although the adjoining territories of Central Kavirondo and Masai were heavily infected.

Vaccinations against this disease were continued during the year in the Samburu Native Reserve. 92674 head have been dealt with by the staff there. It is of interest that there was actual competition amongst native owners for priority of treatment.

The following Native Reserves have been in quarantine for Pleuro Pneumonia during the year:—Masai, Nandi, Lumbwa, Suk, Turkana, Northern Frontier District, Meru, North, South and Central Kavirondo.

The following statement shews the number of outbreaks in the settled areas during the period under review:—

Nakuru District	...	...	...	1
Uasin Gishu & Trans Nzoia Districts	...	...	...	8
Lumbwa District	...	...	...	4
				13

In view of the difficulty in controlling cattle movement it is surprising that only 13 farms were quarantined for Pleuro Pneumonia during the year. The fact that 341,345 doses of Pleuro Pneumonia vaccine were issued from the Veterinary Laboratory during the year is significant when considering the comparatively small spread of the disease from the Reserves to the alienated areas.

ANTHRAX

The incidence of this disease has considerably increased during the year; 50 reported outbreaks in the alienated areas have been dealt with by quarantine measures and vaccination as compared with 27 outbreaks in 1923.

The outbreaks were reported from the following Districts.—

	No. of outbreaks.	No. of animals involved.
Nairobi	22	2,770
Laikipia-Nyeri	10	4,937
Lumbwa	2	...
Uasin Gishu	3	?
Nakuru	13	1,405
	50	9,112

Two outbreaks in the Nairobi District occurred in Mules.

During the year 9,112 cattle were vaccinated as against 6,417 in the previous year. It is established that the double vaccination against the disease is effective, and an immunity is conferred, without mortality.

Several outbreaks of the disease have come to light in the first place by deaths reported among natives after eating meat of a dead animal. As the result of these reports co-operation has been established with the Medical Department whereby such outbreaks are dealt with by both departments to guard against conveying the disease by the means of meat and milk.

The disease is known to exist in all the native reserves.

FOOT AND MOUTH DISEASE.

In the 1923 Annual Report the justification of restricting movement on account of this disease was discussed, and it was considered doubtful if the benefits derived from Quarantine restrictions warranted such a course. The discussions were continued during 1924, and resulted in the removal of the restrictions. This action has been justified inasmuch as outbreaks have not increased.

TRYPANOSOMIASIS.

Extensions of this disease have continued to be detected in hitherto clean areas. The duration of the outbreaks depend on the cause. Outbreaks due to infected animals being taken to areas free from Tsetse fly are not difficult to deal with, but may prove expensive to the owner. The risk of spread in such cases has been negligible. Other outbreaks in fly free areas due to game, usually buffalo, bringing the fly with them from tsetse fly infested country and encroaching on pasture used by stock are dealt with by the Game Department allowing unlimited shooting in such areas with a view to exterminating the offenders.

REDWATER AND GALLSICKNESS.

Both these tick-borne disease are general throughout the Colony.

Reports of mortality from them in young stock are increasing.

In the absence of regular dipping, Stockowners are advised to use the redwater gallsickness vaccine for the inoculation of calves soon after birth.

BLACKQUARTER.

This disease becomes more widely reported with the extension of stock breeding. 25,260 doses of Blackquarter vaccine were sold to Stock Owners during the year.

All Stock Owners are advised to immunize on pasture when losses have occurred.

TUBERCULOSIS.

At the time of writing all quarantines for this disease have been raised after extensive use of the Tuberculin test.

STERILITY IN CATTLE.

This is a condition that is slowly forcing itself into prominence amongst Stock Farmers. It is a most important question, and its claim for attention will become more insistent as cattle farming increases, and as work is undertaken amongst the live stock in the Reserves.

The economic value of a herd is largely governed by its rate of increase. It is characteristic that certain breeds of cattle are more fertile than others: this applies with equal certainty to the different types of our native cattle as to imported stock.

Many influences contribute to the ultimate expression of this character. There is little doubt that barrenness can normally be explained on physiological grounds, the determining factor being the absence of essential elements at the time of service, but attention to other special and important predisposing causes which influence fertility is necessary. The most important of these are nutritional causes that influence the condition of animals at time of service, and during gestation. Other influences include the district in which herds are kept, climatic conditions during gestation, the method of cattle husbandry employed, while the question of other factors leading to abortion cannot be ignored.

ULCERATIVE LYMPHANGITIS.

During the year seventy-six cases of Ulcerative Lymphangitis were reported, and the following statement shows the number of cases which occurred in the various districts as compared with the last two years.

District.	No. of Cases 1922.	No. of Cases 1923.	No. of Cases 1924.
Uasin Gishu-Trans Nzoia ...	45	20	22
Nairobi-Kiambu-Machakos ...	43	19	11
Kisumu-Londiani ...	13	10	7
Kericho-Kavirondo ...	11	2	23
North Nyeri ...	10	7	6
Nakuru ...	8	18	7
Masai Reserve ...	...	1	...
	130	77	76

The majority of the cases were found affecting mules which is partly attributable to the ungroomed state these animals are usually found, and also to the inadequate stabling, which predispose towards actual infection.

It is well known that a case of Ulcerative Lymphangitis is rare in the various racing stables in this country where animals receive good grooming and management.

The Lumbwa and Uasin Gishu District have for the last three years reported more cases than the other districts and the predisposition is the incidence of tick life, particularly the Bont tick &c.

It is hoped that owners of infected animals would consider the advisability of slaughtering equines instead of allowing the disease to become generalised and so spreading infection, until such times as a preventive or curative agent is available for use.

EPIZOOTIC LYMPHANGITIS.

In 1924 only thirteen cases of this disease were reported as compared with 16 cases in 1923 and 32 cases in 1922.

The following statement shows the number of cases which occurred in the various districts as compared with the last two years.

District.				No. of Cases 1922.	No. of Cases 1923.	No. of Cases 1924.
Nairobi-Kiambu-Machakos	...			8	7	6
Uasin Gishu-Trans Nzoia	...			8	1	2
Londiani-Kisumu	...			6	2	2
Nakuru	...			7	2	...
Kericho-Kavirondo	...			3	3	...
Nyeri	...			...	1	3
				32	16	13

The gradual decrease in the number of reported cases is due to the slaughter of infected animals suffering from the disease in the chronic stages.

HORSE SICKNESS.

Except for an outbreak causing high mortality among an imported mob of Abyssinian ponies and mules in the Isiolo Quarantine Station only ten deaths from Horse Sickness have been recorded from the various districts of the Colony. The districts from which the outbreaks were reported were Nakuru, Naivasha and Lumbwa.

DISEASES OF SHEEP.

The sheep industry of the alienated areas is confined to wool bearing sheep, and no trouble of serious consequence was reported.

The chief worries experienced by sheep farmers are due to wire worm and scab. The wireworm remedy sold by Government is largely used as shown in the Chief Veterinary Research Officer's report. 287,000 doses were issued during the year. An effective cure for scab is also discussed in the Chief Veterinary Research Officer's report.

DISEASES OF POULTRY.

Kikuyu Fowl Disease is still the chief cause of mortality amongst poultry. The vaccine issued by the Laboratory continues to be largely used. 7,385 doses were used during the year.

Major Brassey Edwards devoted part of his leave during the year to a study of economic poultry farming, and the knowledge he gained should prove of value to poultry farmers.

DISEASES OF DOGS.

The quarantine restrictions continue to be directed to the isolation for a period of four months of all dogs.

10 dogs were imported from India and passed through Nairobi Quarantine Station.

No case of rabies was reported during the period under review.

Canine piroplasmosis (tick fever) is endemic, and all imported dogs sooner or later contract the infection.

Trypanblau is issued on payment by the Veterinary Service, and is used extensively as a curative.

LIVESTOCK IMPORTATIONS.

The livestock importations through the ports of Kilindini and Mombasa for the past twelve months were as follows, (the return for the last year is also given for purposes of comparison).

	1923	1924
Horses	30	18
Cattle	323	364
Sheep and Goats	4,342	6,540
Pigs	12	58
Camels	27	48
Mules	1	9
Donkeys	20	111
Dogs	68	76
Cats	17	7
Poultry	219	319

The importations included 508 purebred Sheep from Australia and South Africa, 16 horses from England, India and South Africa, and 34 purebred cattle from England, South Africa and Australia.

ABATTOIR RETURNS.

The following abattoir returns have been received from Nairobi, Mombasa, Lumbwa and Nyeri :—

	Number of cattle slaughtered.	Number of sheep and goats slaughtered.	Number of pigs slaughtered.	Percentage of beef carcases condemned on account of measles.
Nairobi ...	10,936	20,212	943	5·7
Mombasa ...	4,061	3,360	...	?
Lumbwa ...	467	480	160	1·7

BRANDING OF STOCK ORDINANCE 1907.

The following are the particulars of brands registered, transferred and cancelled during the period under review :—

Brands Registered	...	161
Brands Transferred	...	1
Brands Cancelled	...	1

Brands iron to Departments	...	124
Brands iron to Private Individuals	...	182
" S " Brands iron to Private Individuals...		30
Sets Numerals		11

A. G. DOHERTY,
Ag. Chief Veterinary Officer,

APPENDIX "D."

ANNUAL REPORT OF THE CHIEF VETERINARY RESEARCH OFFICER, DIVISION OF VETERINARY RESEARCH, KABETE.

For the period 1st January, 1924 to 31st December, 1924.

The Honourable,

THE DIRECTOR OF AGRICULTURE,
NAIROBI.

SIR,

I have the honour to submit the following Report upon the work of this Division for the above-mentioned period.

A. STAFF MOVEMENTS.—

The following Officers proceeded on Vacation Leave during the year :—

Mr. W. Kearney, Assistant Chief Veterinary Research Officer.

Mr. T. C. Bradshaw, Veterinary Research Officer.

Mr. A. E. Johnstone, Clerk.

Mr. J. Ford, Laboratory Assistant.

Mr. J. Scott, Storekeeper.

Mr. O. Stenmark, Mechanic.

The following Officers returned from Vacation Leave :—

Mr. J. Walker, Chief Veterinary Research Officer.

Mr. S. H. Whitworth, Veterinary Research Officer.

Mr. H. J. Gray, Laboratory Assistant.

Mr. J. Forsyth, Yard Foreman.

Mr. W. White, Clerk.

Mr. O. Stenmark, Mechanic.

Transfers.—The following Officers transferred to the Veterinary Department of Northern Nigeria :—

Mr. W. Kearney, Assistant Chief Veterinary Research Officer.

Mr. J. Ford, Laboratory Assistant.

Temporary Appointments.—Mr. A. Wellings was appointed temporarily to the post of Mechanic, during the period Mr. Stenmark was absent on Vacation Leave.

Vacancies.—The posts of Assistant Chief Veterinary Research Officer and Laboratory Assistant, rendered vacant by the transfer of Mr. W. Kearney and Mr. J. Ford, were still unfilled at the end of the year.

Retrenchment.—The establishment of this Division for 1924 was reduced by:—

- 1 Veterinary Research Officer, Post vacant.
- 1 Laboratory Assistant, Mr. P. H. Poolman.
- 1 Clerk, Mr. L. Myers.

Mr. P. H. Poolman was transferred to the Field Staff as Stock Inspector. Mr. L. Myers was transferred to the Head Office.

Acting Appointments.—Mr. W. Kearney acted in the post of Chief Veterinary Research Officer until my return from Vacation Leave at the end of January.

Mr. T. C. Bradshaw acted as Assistant Chief Veterinary Research Officer during the same period.

Mr. S. H. Whitworth acted in the post of Assistant Chief Veterinary Research Officer on and after the departure on leave of Mr. W. Kearney, in May.

b. Administrative Activities.—

Correspondence.—3,081 Inward and 3,097 Outward papers were dealt with during 1924, a total of 6,178 and an increase of 1,886 over the preceding year. This does not include communications received and despatched in connection with Slides and Specimens submitted for examination, or the numerous letters and papers sent to the Laboratory for minuting.

Laboratory Farm.—Ten acres of Farm Land to the South of the Railway Line were assigned to the Education Department for the purpose of establishing a Native Industrial Training Depot.

In addition to the usual cultivation, etc., connected with the production of foodstuffs for Laboratory animals, a certain amount of work was done in the preparation of an area of land for the Plant Breeding Branch.

The Farm labour was also employed throughout the year on the maintenance and upkeep of roads, fences, grazing land, transport of fuel, stone, murrum, etc.

Sixty acres of land at the Upper Farm was fenced off with a double fence for experimental work on East Coast Fever.

A Breeding herd was maintained on the Lower Farm for the purpose of breeding calves for special experimental work. 72 calves were born of this herd during the year.

BUILDINGS AND PLANT.

Buildings.—No buildings were erected by the Public Works Department during the period under review; all additions, alterations, repairs, etc., being effected by our own workshop staff, under the supervision of the Laboratory Mechanic. New buildings included the completion of Artizan's Quarters commenced in 1923, the erection of an Isolation House for East Coast Fever experiments, and the commencement of new Quarters for native labour. All Laboratory and Farm Buildings, Staff Quarters, etc., were also kept in an efficient state of repair.

Plant.—(Steam)—This was in daily use throughout the year. The Boiler was examined at the end of the year by a Boiler Inspector from the Uganda Railway, and found to be in good order.

Plant.—(Gas)—The Gas System was overhauled, and repairs and replacements effected where necessary.

Plant.—(Electric)—This was kept running satisfactorily, but is far too inadequate for our requirements.

Water Supply.—Certain improvements and extensions were effected in the Swamp water supply, but the supply from the Municipal main is still inadequate.

Apparatus.—Three Steam Autoclaves, a Gas Incubator, and a Hand Centrifuge were received from England, and installed in the Laboratory, during the year.

General.—A considerable amount of work was carried out in the Laboratory workshop. This included repairs to Transport Vehicles, Farm Implements, and Laboratory Apparatus, the manufacture of serum and other packing cases, Cattle feeding troughs, and various appliances for use in the Laboratory.

Improvements were effected in the drainage and sanitary systems.

FINANCE.

Expenditure.—The total sanctioned expenditure for this Division for the year 1924 was £21,790; a reduction of £3,320 on the amount sanctioned for 1923.

Revenue.—The revenue realised from the direct sale of Laboratory products will probably amount to £7,000. This does not include revenue accruing from Anti-Rinderpest Serum

issued to the Veterinary Division Staff for inoculations in the Field; such revenue being credited in the Veterinary Division Books under the sub-head "Testing, Dipping Fees, etc". The value of Anti-Rinderpest Serum issued to the Field Staff during 1924 is £12,435.

The total value of Laboratory products issued during the year, for which charges are gazetted, is £18,577. Other products to the value of £5,227 were manufactured and issued free of charge.

The sale of surplus Laboratory Stock, not required for further experiment, realized £48.

LIVESTOCK.

SPECIES.	On Books 31-12-23.	Received during 1924.	Remaining on Books 31-12-24.
Horses ...	17	28 (includes 3 births)	12
Mules ...	31	8	33
Donkeys ...	...		...
Cattle ...	730	550 (" 88 ")	721
Sheep ...	93	90 (" 12 ")	48
Goats ...	24	10 (" 9 ")	15
Pigs ...	86	49 (all births)	71

c. Technical.—

- (1). Technical Routine.
- (2). Technical Research.

(1).—The number of specimens submitted for examination totalled 9,660, an increase of 3,107 over the previous year; of this total, 5,548 were specimens of blood sent in to the Laboratory for Serum Diagnosis of Bovine Pleuro-pneumonia.

The classification of the diagnoses arrived at is as follows :—

BOVINES	TOTAL EXAMINED	9203
Anaplasmosis		194
Anthrax		39
Suspicious Blackquarter		6
Blackquarter		15

Trypanosomiasis	...	...	...	161
Suspicious East Coast Fever	...	...	...	20
East Coast Fever	...	...	...	511
Piroplasmosis	...	...	...	193
Pleuro-pneumonia Contagiosa bovm	...	...	...	152
Suspicious Redwater	...	...	...	1
Redwater	...	...	...	44
Suspicious Contagious Abortion	...	...	...	1
Contagious Abortion	...	...	...	52
Rinderpest	...	...	...	4
Ulcerative Lymphangitis	...	...	...	1
Demodectic Mange	...	...	...	1
Trypanosoma Theilerei	...	...	...	1
Trichocephalus affinis (Trichuris ovis)	...	...	...	1
Bacillary Necrosis	...	...	...	1
Broncho pneumonia	...	...	...	1
Measles	...	...	...	2
Streptococcal Infection	...	...	...	3
Streptothricosis	...	...	...	1
Arsenical poisoning	...	...	...	2
To Government Analyst	...	...	...	1
Negatives	...	...	...	7795
EQUINES (Horses) TOTAL EXAMINED				175
Ulcerative Lymphangitis	...	...	...	88
Suspicious Epizootic Lymphangitis	...	...	...	1
Epizootic Lymphangitis	...	...	...	5
Trypanosomiasis	...	...	...	2
Anthrax	...	...	...	1
Fragilitis ossium	...	...	...	1
Negatives	...	...	...	77
EQUINES (Mules) TOTAL EXAMINED				49
Ulcerative Lymphangitis	...	...	...	16
Epizootic Lymphangitis	...	...	...	6
Tick Fever	...	...	...	1
Trypanosomiasis	...	...	...	1
Anthrax	...	...	...	1
Negatives	...	...	...	24
EQUINES (Donkeys) TOTAL EXAMINED				14
Epizootic Lymphangitis	...	...	...	1
Negatives	...	...	...	13
CANINES TOTAL EXAMINED				107
Tick Fever	...	...	...	49
Trypanosomiasis	...	...	...	1
Septicaemia	...	...	...	1
Anaemia	...	...	...	1
Negatives	...	...	...	55

OVINES	(Sheep)	TOTAL EXAMINED			32
Sheep Pox	...	..	...	...	2
Lymphadenitis	...	...	...	...	2
Dermatitis	...	...	...	...	1
Contagious Nasal Catarrh	...	...	...	...	1
Wireworm	...	...	...	...	1
Pneumonia necrotica	...	...	...	...	2
Broncho pneumonia	...	...	...	...	1
Streptothricosis	...	...	...	...	1
Negatives	...	...	...	...	21
OVINES	(Goats)	TOTAL EXAMINED			2
Negatives	...	...	...	...	2
AVIANS	(Fowls)	TOTAL EXAMINED			54
Kikuyu Fowl Disease	...	...	...	...	18
Peritonitis	...	...	...	...	5
Tapeworm	...	...	...	...	3
Roundworm	...	...	...	...	1
Roup	...	...	...	...	1
Cancer of the Mysentery	...	...	...	...	1
Negatives	...	...	...	...	25
AVIANS	(Ducks)	TOTAL EXAMINED			2
Tumour in Teritoneum	...	...	...	...	1
Negatives	...	...	...	...	1
AVIANS	(Turkeys)	TOTAL EXAMINED			9
Kikuyu Fowl Disease	...	...	...	...	6
Negatives	...	...	...	...	3
AVIANS	(Geese)	TOTAL EXAMINED			1
Negatives	...	...	...	...	1
PORCINES		TOTAL EXAMINED			3
Negatives	...	...	...	...	3
WILD GAME	(Buck)	TOTAL EXAMINED			1
Negatives	...	...	...	...	1
FLIES		TOTAL EXAMINED			3
Tsetse	...	...	...	...	1
To Entomologist	...	...	...	...	2
FLORA		TOTAL EXAMINED			1
To Mycologist	...	...	...	...	1
WATER		TOTAL EXAMINED			3
Negatives	...	...	...	...	3
BUTTER		TOTAL EXAMINED			1
Negatives	...	...	...	...	1

LABORATORY PRODUCTS.

Supplies of Laboratory Products were prepared to meet all demands. The work of preparing and testing Laboratory Products occupies considerable amount of the time of the Laboratory Staff.

On referring to the Tabulated Sheet, shewing the amount of serum, vaccine, etc., prepared and issued during the year, it will be noted that there has been an all-round increase in the quantities prepared and issued, with the exception of Ulcerative Lymphangitis vaccine, and Colon Bacillosis vaccine, and that Sheep Pox vaccine has been added to the list of Laboratory Products.

THE PREPARATION AND TESTING OF LABORATORY PRODUCTS.

(1). Anti-Rinderpest Serum.—

No difficulty was experienced in obtaining, in the Colony, the requisite number of cattle for use as Virus Makers, Serum Makers, and Serum Testers.

Retests of various lots of Anti-rinderpest serum shewed that Anti-rinderpest serum remains effective for a longer period than 2 years.

(2) Blackquarter Vaccine.—

During the year, the powder form of the vaccine was prepared and issued. When the New Wing of the Laboratory, the expenditure for which has been sanctioned, is completed, facilities will exist for the preparation of the pure culture filtrate vaccine, which will then be substituted for the powder vaccine.

(3). Anthrax Vaccine.—(Modification of Pasteur's method).

Although no unfavourable reports have been received, it is proposed to introduce the spore method of vaccine. This will be possible when the new laboratory wing has been completed.

(4). Bluetongue Vaccine.—

Large supplies were not prepared as there has not been a large demand.

(5). Pleuro-pneumonia Vaccine (Pure Culture).—

The large quantities of Pleuro-pneumonia vaccine now prepared and issued occupies the greater portion of the work of

one Laboratory Assistant. The medium used in the preparation of the vaccine is now standardised by the Ph. method, and this ensures greater uniformity of growth of the various lots of vaccine prepared.

(6). Sheep Pox Vaccine.—

A strain of virus was maintained at the Laboratory by passage through Sheep, from which a vaccine was prepared when required. It will be noted that a considerable number of doses have been issued. Each lot of vaccine prepared is tested, and no unsatisfactory results have been reported, following its use.

(7). Contagious Abortion Vaccine.—

A Contagious Abortion Vaccine was prepared, after the method employed by Sir Stewart Stockman; this consists of a bouillon culture of the bacillus of Contagious Abortion (Bang bacillus), a culture of the bacillus abortus; (Bang), on a solid medium, was subsequently substituted for the above-mentioned method.

There has been some demand for the vaccine for use in herds where the disease is prevalent.

Owing to the limited amount of incubator space available, only a limited quantity of the vaccine could be prepared.

Provision has been made for the installation, in the new wing, of an Incubator Room, this when completed will give facilities for the preparation of sufficient vaccine to meet any increased demands.

No change has been introduced in the preparation and testing of the remainder of the Laboratory Products.

PREPARATION OF LABORATORY PRODUCTS.

The following table shows the amounts of serum, vaccines, etc., prepared and issued during the period under review:—

Product.	Quantity on hand 31-12-23.	Prepared by the Laboratory during the year.	Issues for year.	Returned to Laboratory.	Written off.	Balance on hand 31-12-24.
Anti-Rinderpest Serum	...	5,915,250	8,791,450	1,972,580	...	2,428,080 c. cs.
Blackquarter Vaccine, 1st	4,770	26,970	25,260	850	4,770	2,560 doses.
Blackquarter Vaccine, 2nd	4,610	26,970	25,260	850	4,610	2,560 "
Blackquarter Vaccine, 3rd	3,045	...	...	...	...	3,045 "
Anthrax Vaccine, single	28,760	19,000	16,510	2,940	23,460	10,730 "
Anthrax Vaccine, 1st of double	23,820	19,480	16,750	2,780	18,400	10,730 "
Anthrax Vaccine, 2nd of double	13,696	2,820	2,200	...	...	14,316 "
Bluetongue Vaccine	...	341,345	341,345	...	...	...
Pleuro-pneumonia Vaccine	...	19,021	19,021	...	...	...
Sheep Fox Vaccine	...	506	506	...	...	...
Contagious Abortion Vaccine	...	679	645	...	...	110 "
Trypanblue Canine	...	342	236	...	...	122 "
Trypanblue Bovine	...	8,691	8,680	66	...	1,235 "
Colon Bacillosis Vaccine	...	7,385	7,385	...	...	...
Kikuyu Fowl Disease Vaccine	...	...	890	...	...	c. cs.
Ulcerative Lymphangitis Vaccine	...	344	282	...	1,635	62 courses
Ulcerative Lymphangitis Vaccine (Defatted)	...	311,600	287,000	...	...	40,200 doses.
Wireworm Remedy	...	153	153	...	...	...
Redwater and Gallsickness Vaccine	...	...	...	...	...	...

The total value of the above-mentioned issues of sera and vaccines is shewn under Finance.

Details of issues are shown below:—

Product.	Stockowners.	Departmental.	Other Countries.	Laboratory Experiments.	Total Issues.
Anti-Rinderpest Serum	...	6,217,459	1,715,000	35,000	8,791,450 c. cs.
Blackquarter Vaccine, 1st	...	4,500	...	...	25,260 doses.
Blackquarter Vaccine, 2nd	...	4,500	...	...	25,260 "
Anthrax Vaccine, single	...	...	...	...	...
Anthrax Vaccine, 1st of double	5,270	10,560	600	80	16,510 "
Anthrax Vaccine, 2nd of double	5,270	10,720	600	160	16,750 "
Bluetongue Vaccine ...	2,030	...	...	170	2,200 "
Pleuro-pneumonia Vaccine	54,249	281,196	5,900	...	341,345 "
Sheep Pox Vaccine	18,021	...	1,000	...	19,021 "
Contagious Abortion Vaccine	506	...	...	...	506 "
Trypanblue Canine	386	259	...	...	645 "
Trypanblue Bovine	75	154	...	7	236 "
Color: Bacillosis Vaccine	8,680	...	...	...	8,680 "
Kikuyu Fowl Disease Vaccine	7,385	...	...	...	7,385 "
Ulcerative Lymphangitis Vaccine	150	740	...	...	890 c. cs.
Ulcerative Lymphangitis Vaccine (Defatted)	170	112	...	...	282 courses.
Wireworm Remedy	287,000	...	...	...	287,000 doses.
Redwater and Gall sickness Vaccine	153	...	...	...	153 "

(c). TECHNICAL RESEARCH.—

Having regard to the experimental work on East Coast Fever and East African Swine Fever which was to be conducted at this Laboratory, it was considered desirable in the interests of the Colony that I should confer with the Director of Veterinary Education and Research, Union of South Africa, on East Coast Fever, and stock diseases generally, and visit some of the Institutes in the United States of America where research work on American Swine Fever (Hog Cholera) has been carried out and generally the large serum and vaccine producing establishments. Accordingly, during my period of leave, I pursued enquiries thereon.

Through the assistance of the Ag. Director, in the absence on tour of the Director of Veterinary Education and Research, Onderstepoort, Pretoria, I obtained facilities for becoming acquainted with the work previously done on East Coast Fever immunization in South Africa and with the investigations which were being carried out in connection with various stock diseases.

When in the United States of America, I visited the Bureau of Animal Industry and discussed stock diseases generally with the Chief and met several of the Heads of Divisions of the Bureau and conferred with Dr. Dorset on American Swine Fever and arranged for supplies of American Swine Fever virus and Anti-serum for conducting experiments on my return. I also visited Serum and Vaccine Institutes where I obtained a knowledge of the technique of the preparation of various Vaccines and Sera, particularly of Anti-Swine Fever Serum, and some of the larger Institutes where research work on animal diseases is carried out. On my return to the Union of South Africa, I visited the Veterinary Research Laboratory, Onderstepoort, Pretoria, and was afforded opportunities of carrying out some preliminary Swine Fever experiments and of becoming further acquainted with the investigations carried out there, particularly those which would be of assistance in combatting stock diseases in Kenya Colony.

The results of the experimental work conducted since my return in connection with East Coast Fever immunization and East African Swine Fever, are embodied in this Report.

DISEASES OF CATTLE.—

Pleuro-Pneumonia. (Lung—sickness of cattle).

(a). Serum Diagnosis.—

(1). Complement fixation—

Conglutination method.—In the South African Journal of Science, Vol. XX. December, 1923, the writer recorded the apparatus in use, the reagents employed and their method of

preparation, the technique used for the titration of re-agents and the diagnostic tests, gave the results of tests of a number of naturally infected and inoculated cattle, and recorded observations in connection with the following, *viz.*—

- (1). The anticomplementary power of some cattle sera for horse complement.
- (2). First appearance of a specific fixation.
- (3). Duration of the complement of fixing body.
- (4). Existence, or otherwise, of the virus in the lesions of naturally infected cattle.

Since then, modifications with a view to the simplification of the technique have been introduced, and a pure culture antigen substituted for the alcoholic extract of artificially infected tissue antigen, further experiments and observations, in connection with the following, were made, *viz.*—

- (1). Inactivation of suspect and control sera.
- (2). Anticomplementary power of cattle sera for horse complement.
- (3). Antibody content of sera of infected cattle.
- (4). First appearance of a specific fixation.
- (5). Duration of the specific complement fixing body in (a) naturally infected, and (b) cattle inoculated with Lymph Virus obtained by passage through susceptible cattle.

The modifications introduced, the method of preparation of the pure culture antigen, and the further experiments and observations, were published by the writer during the year under review.

Although the method has been simplified, the preparation of the reagents and the carrying out of the tests necessitates very careful technique, and since the staff available for the work is limited to one Officer, only a limited number of sera could be dealt with.

As mentioned above, 5,548 tests were made, of which 152 were "Positive," the remainder gave "No Fixation."

The majority of sera dealt with were collected from trade cattle from infected areas, admitted to Quarantine Stations, in a few instances the test was applied to cattle of infected herds belonging to European owners, and others, in the settled areas, with a view to the elimination of "Lungers". It is anticipated the number of samples submitted will increase considerably, in which case further staff will be required to speed up the work.

(b). *Allergic Reaction.*—In order to determine whether subcutaneous inoculation of a pure culture in Martin's peptone solution, plus beef broth, additioned with 10% cattle serum,

concentrated, in the water bath to one tenth of its original volume after the addition of 0.05% Carbolic Acid, would produce an allergic reaction, which could be made use of as a means of diagnosis, a number of known infected cattle were subcutaneously inoculated with 3.c.cs. of the concentrated culture; it was previously recognised that, if satisfactory results could be obtained, the test would be limited in its practical value to housed cattle, owing to the variations of temperature which occur in exposed healthy cattle.

The results obtained were not encouraging.

Rinderpest.—The utilisation of sheep for the production of Rinderpest Virus for Rinderpest immunisation. (Simultaneous method).

Experiments were previously carried out to determine whether Redwater and Gallsickness (*Anaplasma marginale*) of a bovine are transmissible by inoculation to sheep, and vice versa, and whether the blood of sheep inoculated with Rinderpest blood of a bovine would transmit Rinderpest to bovines.

The results were published in detail, in bulletin No. 4. 1922. Department of Agriculture, Division of Veterinary Research, and were briefly as follows, viz.. (1). Redwater and Gallsickness of a bovine are not transmissible to sheep by inoculation; (2) the blood of sheep inoculated with Rinderpest blood of a bovine transmitted Rinderpest to susceptible bovines.

Further research was carried out to ascertain whether the utilisation of Rinderpest virus of sheep could be successfully substituted for Rinderpest blood of a bovine for Rinderpest immunisation (simultaneous method), in which case the risk of transmitting Redwater and Gallsickness to cattle which escape these two latter infections, on farms on which dipping is regularly resorted to from, or shortly after, birth, would be avoided. A summary of the results are recorded in the Annual Report of the Department of Agriculture, Division of Veterinary Research, for the year ending, December, 1922. Briefly, it was found that a percentage of the cattle reacted normally to Rinderpest and were subsequently proved immune, but in a percentage delayed reactions occurred and, in some cases, the inoculated cattle failed to react and were subsequently proved to be susceptible. It was decided to repeat the experiment on a larger scale; some cattle were inoculated with Rinderpest blood of sheep, without serum, others with Rinderpest blood of sheep and varying amounts of Anti-rinderpest serum, viz., 5, 10, 15, and 20, c.cs. respectively; the results were published in detail during the year under review, and are, briefly, as follows:—(1).

Exceptionally, Rinderpest blood of sheep alone did not transmit Rinderpest to susceptible bovines. (2) Inoculation with Rinderpest blood of sheep and Anti-rinderpest serum (simultaneous method), in varying amounts, produced varying results;

in some instances delayed, in other, irregular reactions with a mortality occurred, some inoculated cattle failed to react and were subsequently proved to be susceptible. (3) Generally speaking, the larger the doses of anti-serum given the fewer reactions occurred.

In view of the above, the substitution of Rinderpest blood of a sheep, for Rinderpest blood of a bovine, is not recommended for Rinderpest immunization, (simultaneous method).

Sheep may, however, be of practical value in the transportation of Rinderpest virus over long distances, and for the inoculation of cattle susceptible to Redwater and Gallsickness destined for producing Rinderpest virus free of Redwater and Gallsickness.

East Coast Fever.—(1). Immunization experiments.

(a) Inoculation of Susceptible Cattle.—for the purpose of determining whether artificial immunization would be of assistance in minimising the losses which occur from East Coast Fever, in this Colony, a number of susceptible grade cattle were, during 1924, inoculated with spleen or gland collected from naturally infected cattle in various stages of the disease, exceptionally the material was obtained from an artificially infected beast; after collection, the spleen and gland were minced in a No. 4. Kendrick mincer, and 10 c.cs. of the pulp, with or without the addition of peptone, injected intrajugularly; in some instances, the pulp was soaked in an 0.65% solution, in water, of Quinine Hydrochloride, to ascertain the effectiveness of this agent in attenuating the virus, and, in a few instances, the pulp was soaked in a solution of Trypanblue to determine whether the risk of transmitting *P. bigeminum*—Redwater—to cattle susceptible to this infection, could be overcome. Inoculated cattle were kept under observation, their temperatures recorded daily, and blood and gland smears collected on various occasions for microscopical examination. In order to obtain the necessary material for inoculation, several susceptible Laboratory cattle were exposed on an East Coast Fever farm situated in the vicinity of the Laboratory; the owner of the Estate kindly arranged for the morning temperatures to be taken and recorded, and for the collection and despatch to the Laboratory of smears from any of the exposed cattle which shewed a temperature reaction; when the existence of East Coast Fever was confirmed microscopically, the affected animal was conveyed to the Laboratory and kept under observation, and subsequently slaughtered if material was required, in which case, the material was inoculated without delay after collection.

The number of cattle inoculated, totalled 206; of this total, approximately 96, whose history was known, were bred from Laboratory stock; they varied in age from a few days to about 18 months, they had been dipped regularly from birth and were, in most cases, susceptible to Redwater and Anaplasmosis; the

remainder, viz., 110, consisted of cattle of various ages, from 1 to 5 years; the majority of these had been utilised for other experiments, chiefly Rinderpest, and were immune to Redwater and Anaplasmosis.

The results of inoculation are grouped as follows, viz,—

<i>Group 1.</i>	Includes cattle in which a temperature reaction to East Coast Fever occurred and in which Koch's bodies were demonstrated in gland smears.	Total 25
<i>Group 2.</i>	Includes cattle in which a temperature reaction occurred but no Koch's bodies were demonstrated in gland smears.	Total 41
<i>Group 3.</i>	Includes cattle in which an irregular temperature reaction occurred but no Koch's bodies were demonstrable in gland smears.	Total 22
<i>Group 4.</i>	Includes cattle in which no temperature reaction to East Coast Fever occurred and no Koch's bodies were demonstrable in gland smears.	Total 73
	NOTE.—Included in this group are 50 head which were inoculated with pulp which microscopically shewed Koch's bodies in very rare numbers.	
<i>Group 5.</i>	Includes cattle which did not react to East Coast Fever to the original or subsequent inoculation.	Total 31
<i>Group 6.</i>	Includes cattle which did not react to East Coast Fever to the original, but reacted to subsequent inoculations.	Total 14
		Total 206

Mortality.—The mortality from East Coast Fever, and other causes, as a result of inoculation totalled 18, made up as follows, viz.—

Mortality from East Coast Fever amongst cattle of group	1=6
do. do. do. do. do.	2=0
do. do. do. do. do.	3=0
do. do. do. do. do.	4=0
do. do. do. do. do.	5=0
do. do. do. do. do.	6=0
	Total 6
Mortality from other causes amongst cattle of groups 1. 2. 3. 4. 5. 6.	Total 12
	Total 18
	=8.73% approx.

NOTE.—The causes of the 12 deaths were as follows, viz.—6 septic infection, 1 embolism, 1 endocarditis, 1 Redwater,

1 Anaplasmosis, 1 sequel of Anaplasmosis and Spirillosis, 1 not determined.

Immunity Tests.—(1). Exposure to natural infection.—For the purpose of determining the immunity to natural infection, conferred by inoculation, a total of 68 head were exposed; of this total, 46 which included reactors in which Koch's bodies were noted in the gland smears, temperature reactors, irregular reactors and non-reactors, have been exposed at Kilungu since the 22-10-24, 16 which include temperature reactors, irregular reactors, and non-reactors, have been exposed in an infected camp at the Laboratory Farm since the 22-11-24; and 6 which include reactors in which Koch's bodies were observed in the gland smears, temperature reactors and irregular reactors, were exposed from the 13-5-24 to the 25-7-24 in the infected camp at the Laboratory Farm.

Susceptible cattle (controls), for the experiment, were included in each lot.

The inoculated and control cattle were put on daily temperatures and blood and gland smears were collected, and microscopically examined, from any which shewed a temperature reaction.

(2). Immunity tests with infected ticks.—In a few instances inoculated cattle were tested on their immunity with nymphal Brown ticks which had engorged as larvae on an infected beast.

The following are the results of the immunity tests up till the 17-1-25 :—

Summary of results of Immunity Tests of inoculated cattle.—

(1). Exposure to natural infection.—

Of a total of 14 inoculated cattle which reacted to East Coast Fever and in which Koch's bodies were noted in gland smears.	{	Died of East Coast Fever	... Nil.
	{	Contracted East Coast Fever and recovered	... 3

Of a total of 21 inoculated cattle which gave a temperature reaction to East Coast Fever.	{	Died of East Coast Fever	... 4
	{	Contracted East Coast Fever and recovered	... 4

Of a total of 16 inoculated cattle which gave an irregular temperature reaction	{	Died of East Coast Fever	... 3
	{	Contracted East Coast Fever and recovered	... 3

Of a total of 17 inoculated cattle which gave no apparent reaction to East Coast Fever.	{	Died of East Coast	
		Fever	...
		Contracted East	3
		Coast Fever and recovered	4

Total died of East Coast Fever 14·70% 10

Total contracted East Coast Fever and recovered 20·5% 14

NOTE.—Since the immunity to exposure experiments are not yet completed, the above results cannot be considered as final.

(2). Immunity to tick infestation.—

Of a total of 5 inoculated cattle which reacted to East Coast Fever and in which Koch's bodies were noted in gland smears.	{	Died of East Coast	
		Fever	... Nil.

Of a total of 4 inoculated cattle which gave an irregular reaction to East Coast Fever.	{	Died of East Coast	
		Fever	...
		Reacted to East Coast Fever and recovered	2

Of a total of 7 inoculated cattle which gave a temperature reaction to East Coast Fever.	{	Died of East Coast	
		Fever	... Nil.

Of a total of 3 inoculated cattle which gave no apparent reaction to East Coast Fever	{	Died of East Coast	
		Fever	...

Total died of East Coast Fever 21% approx 4

Total reacted to East Coast Fever and recovered 5·26% approx. 1

Total tested 19.

Mortality amongst susceptible cattle utilised as controls for the immunity to natural infection conferred by inoculation experiments.

Of the 16 susceptible non-inoculated cattle (controls) exposed at Kilungu	{	Died of East Coast	
		Fever	...
		Died from causes other than East Coast Fever	2
		Survivors	4

Total died of East Coast Fever 62·5% 10

Of the 5 susceptible non-inoculated cattle (controls) exposed in the camp at the Laboratory Farm. { Died of East Coast Fever ... 5 = 100%

NOTE.—Since the exposure to natural infection experiments are not yet completed, the above results cannot be considered as final.

b. *Inoculation of Non-susceptible Cattle.*—

Experiments on the nature of the immunity conferred by recovery from natural infection—To ascertain whether the immunity conferred is absolute and complete, or otherwise, a commencement was made to collect cattle definitely known to have recovered from natural infection, and when a sufficient number are available they will be exposed in a known infected area and kept under observation.

With a view to assisting in obtaining some data on the nature of the immunity, a number of cattle branded T—East Coast Fever immune brand, and a few cattle definitely known to have recovered from natural infection, were inoculated with spleen pulp plus peptone; susceptible cattle (controls) were inoculated, and two beasts definitely known to have recovered from artificial immunization were included in the experiment. The value of inoculation as a means of conferring immunity to a natural infection, and as a means of determining whether trade cattle, admitted to Quarantine Stations prior to entry into settled areas, are immune or otherwise to East Coast Fever, also entered into consideration.

The following is a summary of the results:—

				Number which did not react to East Coast Fever	
Cattle T branded ...	Total inoculated	21			21
Cattle known to have recovered from na- tural infection ...	"	"	2	"	2
Cattle known to have recovered from ar- tificial immunization	"	"	2	"	2
Cattle susceptible to East Coast Fever, (controls) ...	"	"	9	Reacted to East Coast Fever and Koch's bodies observ- ed in gland smears ...	1
				Temperature re- action to East Coast Fever	4
				Non-reactors ...	4

Number of T branded cattle—cattle recovered from natural infection and cattle recovered from artificial immunisation		
Total inoculated	25	Reacted to East Coast Fever Nil
Total susceptible cattle inoculated	9	Reacted to East Coast Fever and recovered 5.55 6% Non-reactors 4.44 4%

Since it had been definitely ascertained from the results of inoculation of susceptible cattle that a percentage do not give an apparent reaction to East Coast Fever, but are nevertheless susceptible to natural infection, the inoculation of trade cattle by the above described method, for the purpose of testing them on their immunity to East Coast Fever, is of little or no practical value; and since a percentage of susceptible cattle, which react to East Coast Fever and shew Koch's bodies in gland smears, and a percentage which give a temperature, an irregular, or no reaction to East Coast Fever, are not immune to natural infection, inoculation of susceptible trade cattle by the above described method, for the purpose of conferring absolute and complete immunity to natural infection, is not recommended.

The following observations were made during the course of the experiments:—

(1). *Transmission of Redwater*.—Inoculation of spleen pulp of a recovered Redwater beast did not always transmit Redwater, susceptible cattle which did not react were subsequently proved susceptible to natural infection.

(2). *Immunity to Anaplasmosis*. (*Anaplasma marginale*).—Two cattle, Nos. 8686 and 8687, were inoculated with Rinderpest virus on the 19th September, 1924. The virus contained Redwater-Gallsickness infections; both reacted to Rinderpest, and to *Anaplasma marginale* from the 38th day after inoculation, and recovered; both were then infested with nymphal ticks which had engorged as larvae on a recovered Redwater-Gallsickness beast. C. 8686 reacted to *Anaplasma marginale* from the 45th to 55th day after infestation, maximum temperature 106°. C. 8687 did not react to *Anaplasma marginale*. It would thus seem that the immunity conferred by inoculation is not, in all cases, absolute and complete to tick infection.

(3). Spirillosis was sometimes noted in the cattle of this Colony.

(4). In animals not under close observation, cases of East Coast Fever may occur amongst highly susceptible grade cattle of 2—3 years old or thereabouts, ending in recovery, and escape observation.

Resume.—

Total susceptible cattle inoculated	=215
Total mortality from East Coast Fever resulting from inoculation ...	6=2.790%
Total mortality from other causes resulting from inoculation ...	12=5.581%
Total number of inoculated cattle tested on their immunity to natural infection	=68
Died of East Coast Fever ...	10=14.705%
Total number of inoculated cattle tested on their immunity with infected ticks	=19
Died of East Coast Fever ...	4=21.052%
Total inoculated cattle contracted East Coast Fever from natural infection and recovered. Total exposed	=68
Total contracted East Coast Fever and recovered ...	14=20.5%
Total naturally immune cattle inoculated	=23
Reacted to East Coast Fever ...	Nil.
Total non-inoculated susceptible cattle (controls) exposed to natural infection	=21
Died of East Coast Fever ...	15=71.42%

Serum Diagnosis Experiments. (Conglutination method).—

A number of tests were made to ascertain whether the serum of infected East Coast Fever cattle gives a "fixation". Alcoholic extracts of the spleen, lymph, glands and washed *Theileria parva* collected from infected cattle, were used as antigen.

Extracts of dried material and saline extracts of the above-mentioned were also used as antigen.

The results were not encouraging.

Nakuruitis.—Two susceptible cattle were forwarded to the Laboratory in December, 500 c. cs. of blood was transfused from each to healthy grade cattle. The latter were put under close observation and daily temperatures recorded; they remained apparently healthy and a normal temperature curve has been recorded to date, *viz.*, 30th January 1925.

Sterility in Cows.—The cause of sterility in grade cows was investigated.

An opportunity was afforded of examining the genital organs of 8 cows.

The pathological findings were as follows, *viz.*—

In 3. Cystic ovaries and Salpingitis.

In 2. Cystic ovaries and persistent Corpus luteum.

In 1. Cystic ovary, Salpingitis and persistent Corpus luteum.

In 1. Cystic ovary.

The remaining cow was found to be pregnant.

Spirillosis.—The existence of Spirillosis in cattle has been recorded in various countries. During the East Coast Fever experiments it was necessary to frequently examine blood and gland smears of cattle born and bred in this Colony; Spirillosis was noted in blood smears on various occasions.

Mastitis amongst Milking Cows.—An outbreak of Mastitis was investigated. The first symptoms were observed usually within 24 hours after calving.

The symptoms were.—Acute inflammation of one or more quarters of the udder of an affected cow, the gland being hot and painful to the touch, the milk yield rapidly decreasing until little or no milk could be drawn from the affected quarter. Any fluid obtainable contained pus, sometimes blood tinged especially in early cases. In older cases small amounts of a serous clear fluid was all that could be obtained.

In very acute cases, symptoms of fever were noted—staring coat, rise in temperature (105° — 106° F.) rapid breathing, and accelerated pulse, muscular weakness, the cow being able to rise only with difficulty.

Later the constitutional symptoms disappeared, the acute inflammation of the udder subsided, and milk yield was completely lost, clear serous fluid being all that could be drawn from an affected quarter. In these cases, the affected quarter gradually decreased in size until it was little bigger than a normal empty quarter. On palpitation the gland substance was hard in consistence.

From a typical acute case, a pure culture of a Streptococcus was obtained. This case was undoubtedly one of Streptococcic Mastitis, and it may be assumed, from the details given, that the infection in the herd was Streptococcic Mastitis.

It was recommended to the owner that strict isolation of affected cattle be observed, together with disinfection of any material obtained from the mammary glands of these animals, and the separate attention of these cattle by special boys. The treatment of old cases was not recommended.

Advice has been received that to date no further cases have occurred.

DISEASES OF SHEEP.

Besides the commoner known diseases of sheep which occur in this Colony, *e.g.*,

- (1). Parasitic infections (endoparasites).
- (2). Psoroptic Scabies.
- (3). Bluetongue.
- (4). Sheep Pox.
- (5). Heartwater.
- (6). Diseases of the feet—(Foot-rot).

others, which have so far not been extensively investigated but which are of economic importance, are known to occur, *e.g.*,

- (7). A disease resembling Colon bacillosis.
- (8). Sheep pneumonia.

and during the latter end of the year under review, two blood infections, *viz.*,

- (9). Piroplasmosis.
- (10). Spirillosis.

were observed in lambs.

(1). *Endoparasites*.—(a). Of the internal parasitic infections the Nodular worm (*Oesophogostoma columbianum*) is probably the most serious, no medicinal or other agent is so far known which may be considered a specific in the treatment of this affection. It is noted in the Report of the Director of Veterinary Education and Research, Onderstepoort, Pretoria, for the year ended 30th June, 1924, and which is embodied in the Annual Report of the Department of Agriculture, Union of South Africa, for that year; that very good progress was made in connection with the study of the life history of the Nodular worm, and that the use of tobacco in the form of a lick during the season of the year when the danger of worm infection is greatest, has given encouraging results; the results of preliminary experiments shewed that sheep receiving a regular supply of tobacco in solid form, are not so easily infected with larval worms.

(b). Wireworm. (*Haemonchus contortus*).—The value of the Government Wireworm Remedy in the treatment of Wireworm, reflects itself in the increased demands for the remedy.

(c) Tapeworm infections.—Use is also made of the Government Wireworm Remedy for the treatment of Tape worm infections.

(d). *Stilesia hepatica*.—A parasitic infection of the liver has been found to be of fairly common occurrence,

(c). Distoma infection (Fluke) has not been observed to occur to any extent.

(r). Echinococcus infection is rarely observed.

(2). Psorptic Scabies (Sheep scab).—In order to acquaint sheep owners with the results of the experiments on the life-history of the causal parasite, *viz.*, *Psoroptes communis ovis*, and the results of the dipping trials, with various homemade and proprietary dips, carried out in South Africa by the Division of Veterinary Education and Research, a bulletin was published by the Division of Veterinary Research, Kenya Colony, and circulated amongst sheep owners.

In one instance unsatisfactory results were advised as having occurred, following the dipping of high grade Merino sheep at 9 days interval and an immersion period of two minutes, these sheep were carrying a six months fleece or over. The dip used in this instance was Arsenite of Soda at a tank strength of $2\frac{1}{2}$ lbs to the 100 gallons of water, to which 5 lbs Sulphur per 100 gallons of water was added.

(3). Blue Tongue.—Blue Tongue is known to occur some years during the short or long rainy seasons.

Generally speaking, vaccination of flocks with Blue Tongue vaccine is not resorted to; serious losses are known to have occurred, in the past, amongst unvaccinated flocks.

The objections to the use of the vaccine would appear to be the following, *viz.*,

(1). Cost.

(b). Immunity conferred is not absolute and complete, thus necessitating yearly inoculation.

(c). Loss of condition in inoculated sheep and sometimes some loss of wool.

(d). Immunisation can only be carried out at certain times of the year, having regard to the condition of the sheep, grazing and lambing season.

(e). Mortality from vaccination.

No better method than the one available, *viz.*, vaccination with an attenuated virus, is known. It is recognised that inoculated sheep may lose condition and that there may be a small percentage of mortality, 1 to 2 %, but the immunity conferred is equal to that following upon an attack induced by natural infection.

It has been suggested by some owners that an anti-serum should be prepared for issue; the objection to the use of an anti-serum is the temporary nature of the protection given; on account of the short duration of the passive immunity conferred.

red, and taking into consideration the fact that the risk of infection in exposed flocks may extend over some weeks, more than one inoculation would be necessary. Anti-serum as a curative would only be effective when used in the incubative or early stages of the disease, and since sheep are not usually under sufficiently close observation it would, in the majority of cases, be injected too late to have any beneficial effects.

The cost of the vaccine, viz., 20 cents of a shilling per dose is cheaper than an antiserum could be prepared for.

(4). *Sheep Pox—Variola ovina.*—Several outbreaks of Sheep pox were investigated, in one instance a serious mortality occurred. A strain of virus was obtained and made use of for the preparation of a vaccine, the use of which has proved of value in controlling the spread of the disease.

A strain of virus is now maintained at the Laboratory and supplies of vaccine prepared to meet all demands.

A bulletin on Sheep pox was published and circulated amongst sheep owners.

(5) *Heartwater.*—No outbreaks have been brought to our notice during the year.

(6). *Diseases of the feet—(Foot-rot).*—have been reported as occurring, but an opportunity of determining whether the cause was due to a specific organism, or otherwise, did not occur.

(7). Colon bacillosis has not been investigated.

(8) *Sheep Pneumonia.*—During investigations in connection with Sheep pox, lesions were found in the lungs which are described as occurring in Sheep pox, in addition there were found to exist other lung lesions, of an apparently specific nature which, as far as the writer is aware, have not been recorded as occurring in Sheep pox; cultures of material collected from the lesions produced a growth of an organism morphologically resembling the Preiz-nocard bacillus, a similar condition was recently found in sheep on an estate on which Sheep pox did not exist and further research is being carried out to establish the cause.

(9). Piroplasmosis has been recorded as occurring in various countries. The parasites described differ in important respects.

In August last a sick Merino lamb about 2-3 months old, Laboratory No. 2444, was forwarded to the Laboratory for examination. The symptoms noted were anaemia and unthriftiness.

Blood examination shewed pathological changes indicative of anaemia and an endoglobular parasite, small in size, mostly ring shaped, rarely bacillary forms were observed; elements similar to Koch's bodies were not observed in spleen or gland smears.

On Post-mortem examination parasitic infection with the Nodular worm (*Oesophogostoma columbianum*) and *Stilesia hepatica* was noted.

In order to determine the pathogenicity of the piroplasm, two lambs, Nos 2406 and 2417, and two kids Nos. 295 and 298 were inoculated with blood of S. 2444; slight anaemia was noted in one, kid No. 295, and piroplasms were detected in one of the lambs, No. 2406; a temperature reaction was recorded in the kids from the 15th day and blood examination shewed slight pathological changes indicative of anaemia, and piroplasms in one of the kids. Piroplasms were noted in S. 2406, on the 108th day after inoculation, an irregular temperature reaction was also recorded in the latter from the 16th day after inoculation.

Lambs born and reared in a tick free stable were then inoculated with blood of S. 2406 and 2417, and kid 295, respectively, with the result that with the exception of a slight anaemia, no symptoms were noted.

The parasite probably belongs to the genus *Gonderia*; as far as the writer is aware, the existence of Ovine piroplasmosis has not previously been recorded in this Colony.

It would seem that the parasite described is not of much pathogenic importance.

(10). *Spirillosis*.—In July last, a sick Merino lamb, Laboratory No. 2445, was sent to the Laboratory for examination. The symptoms noted on examination were unthriftiness. Blood examination shewed bodies resembling "Jolly" bodies, changes indicative of anaemia and an endoglobular parasite similar in appearance to that described above as occurring in S. 2444.

A few days after arrival "*Spirillosis*" infection was observed in the blood smears.

The lamb died on the 26th day after arrival. Post-mortem examination shewed anaemia and Cachexia, and infection with the Nodular worm (*Oesophogostoma columbianum*).

Spirillosis has been recorded as occurring in sheep and other domesticated animals in various countries and to be responsible for producing a disease, a characteristic of which is anaemia.

DISEASES OF EQUINES.

Ulcerative Lymphangitis of Equines.—

(1). Employment of a "defatted" vaccine as a curative agent.—

During 1923 and the early part of 1924, experiments were undertaken to determine the curative effects of a "defatted" vaccine prepared from mass culture of the Preiz-nocard bacillus.

A total of 20 affected equines (Horses and Mules) were treated and kept under observation; of this total 2 were considered incurable and destroyed; in 15 cases the lesions disappeared after treatment and the animals were discharged; in 3 cases the lesions disappeared but recurred and the animals were put under further treatment. The following observations were subsequently made: in 4 cases a recurrence occurred and further vaccine treatment proved ineffective; in addition reports have been received from 5 owners indicating recurrences after treatment with "defatted" vaccine. In addition to the above, 4 horses were treated and kept under observation; in 3 no improvement resulted; the remaining animal was discharged apparently cured, but a recurrence occurred. From these observations it would appear that the efficacy of a "defatted" Ulcerative Lymphangitis vaccine in the curative treatment of this disease, is doubtful.

(2). Employment of Sodium—Potassium—Bismuth—Tartarate.—During 1923 the use of this drug as a curative was investigated with disappointing results. During 1924 reports were received from several sources claiming good results following treatment with the drug and it was decided to reinvestigate its value. For this purpose, 13 affected equines (8 Horses and 5 Mules) were treated and kept under observation. A supply of the freshly prepared drug was kindly supplied by the Chemical Research Laboratory. The method of employment was as follows, *viz.*—

30 c. cs. of a 12% solution (3.6 grammes) of Sodium-Potassium—Bismuth—Tartrate in sterile distilled water was injected intramuscularly at 4 days interval; the number of injections given varied from 6 to 12.

Acute and chronic cases were used for the experiment.

Summary of results.—Of the 13 equines treated, 8 shewed no improvement and 5 were returned to their owners apparently cured; in these 5 cases, however, it does not seem probable that the apparent cures were the result of the use of the drug.

Conclusions.—From these experiments it would appear that the value of intramuscular injections of Sodium—Potassium—

Bismuth—Tartrate in the treatment of Ulcerative Lymphangitis, must be considered doubtful.

(3). *Employment of Antiserum.*—Experiments are now being carried out to ascertain the value of serum prepared by repeated injections of horses with a filtrate of cultures of the Preiz—nocard bacillus.

SWINE DISEASES.

East African Swine Fever.—

Experiments to immunise pigs.—(1). Employment of American Swine Fever (Hog Cholera) virus and American Swine Fever (Hog Cholera) antiserum.

To determine whether pigs immunised against American Swine Fever (Hog Cholera) are resistant to the East African virus, supplies of virus and antiserum were obtained from the United States of America. 4 different lots of virus and 3 lots of virus were obtained, the latter from different sources.

Virus lots 1 and 2 were proved to be avirulent on arrival at Kabete.

Virus lot 3 was obtained by the writer, during his visit to the United States of America, from Ames Laboratory; it was collected and mixed in equal parts of O. C. G. preservative on the 13th October, 1923, and brought to South Africa at ordinary ship's temperature and tested on its virulency, at Onderstepoort, on the 13th December, 1923, and found to be avirulent; virus of the same bleeding was stored at Ames Laboratory in cool chamber and found to be virulent on or about the latter date; it has thus to be concluded that virus lot 3 lost its virulency in transit.

East African virus collected and preserved in O. C. G. equal parts at Kabete on the 20th June, 1923, and stored there at ordinary room temperature until the 8th July, 1923, and then brought to South Africa at ordinary ship's temperature and kept in cold chamber at Onderstepoort from the 1st August, 1924, till the 13th December, 1924, and then tested on its virulency, was proved to be still virulent.

Virus lot 4 was despatched from the United States of America on the 17th January, 1924, consigned in ship's cool chamber; it reached Kabete Laboratory on the 17th April, 1924 and was proved to be virulent on arrival.

Experiments to ascertain (1). Whether pigs immunised against America Fever (Hog Cholera) were resistant to the

East African virus and (2) whether the American Swine Fever (Hog Cholera) antiserum protected against the East African virus, were then carried out.

The results shewed that pigs immune to American Swine Fever are not resistant to the East African virus and that neither of the 3 lots of American antiserum protected against the East African virus.

NOTE.—The latter observation was made in 1922 with a lot of antiserum obtained from the United States of America, and the opportunity was taken of repeating the experiment with the other lots of antiserum which were available.

(2). *Attenuation Experiments*.—Attempts to attenuate the East African virus with the following were made, *viz.*—

(a) Lugol's solution.

(b) Trypanblue solution, and

(c) Sodium—Potassium—Bismuth—Tartrate.

(a). Lugol's solution was employed as follows, *viz.*—equal parts of Lugol's solution undiluted and diluted, and virus in equal parts of O. C. G. preservative were mixed and left in contact for varying periods. 2 c. cs. of the respective mixture were injected subcutaneously. The following is a summary of the results.

(a). Equal parts of undiluted Lugol's solution and virus in O. C. G. left in contact for 10 minutes, did not produce a reaction. (4 in experiment).

All 4 were subsequently proved to have acquired no immunity.

(b). Equal parts of 75% Lugol's solution and virus in O. C. G. left in contact for half an hour, produced reactions and death. (2 in experiment).

Incubation period 7 and 14 days respectively.

(c). Equal parts of 75% Lugol's solution and virus in O.C.G. left in contact for 48 hours, produced no reactions. (3 in experiment).

Non-reactors were subsequently proved to have acquired no immunity. Reinoculation with 75% Lugol's solution and virus in O.C.G. of another pig, left in contact for 48 hours, produced reactions and death.

Incubative period 8-16, 17, 17 days respectively.

(d). Equal parts of 50% Lugol's solution and virus in O.C.G. left in contact for 1 hour, produced reactions and death. (2 in experiment).

Incubative periods 7 and 13 days respectively.

(e). Equal parts of 50% Lugol's solution and virus in O.C.G. left in contact for 48 hours, produced reactions and death. (2 in experiment).

Incubative periods 5 and 13 days respectively.

(f). Equal parts of 25% Lugol's solution and virus in O.C.G. left in contact for $1\frac{1}{2}$ hours, produced reactions and death. (2 in experiment).

Incubative period 12 and 14 days respectively.

(g). Equal parts of 25% Lugol's solution and virus in O.C.G. left in contact for 48 hours, produced reactions and death. (2 in experiment).

Incubative period 5 and 14 days respectively.

Resumé.—(1). Undiluted Lugol's solution left in contact with virus for 10 minutes, destroyed the virulency.

(2). 75% Lugol's solution left in contact with virus for 48 hours, destroyed the virulency. reinoculation of 75% Lugol's solution left in contact with virus of another pig for 48 hours, produced reactions and death.

(3). 75% Lugol's solution left in contact with virus for $\frac{1}{2}$ an hour; 50% Lugol's left in contact for 1 and 48 hours respectively, 25% Lugol's left in contact for $1\frac{1}{2}$ and 48 hours respectively, did not render the virus avirulent but lengthened the incubative period.

(b). *Trypanblue Solution.*—Meister Lucius and Bruning (Hoechst).—Equal parts of a 3% solution of Trypanblue and virus in O.C.G. were left in contact for 48 hours.

2 c. cs. injected subcutaneously. (2 in experiment).

Incubative period 2 days respectively.

Result.—Both pigs died of Swine Fever.

(c). *Sodium—Potassium—Bismuth—Tartrate.*—

Equal parts of a 12% solution of Sodium—Potassium—Bismuth—Tartrate, in distilled water and virus in O.C.G. were left in contact and 4 c. cs. injected subcutaneously. (2 in experiment).

Incubative period 2 days respectively.

Result.—Both pigs died of Swine Fever.

DISEASES OF POULTRY.

Note on the vaccination of Fowls against Kikuyu Fowl Disease.—

(a). Local half bred birds.

(b). Imported birds.

During the months of November and December two lots of local half bred fowls, totalling 49 birds, and one lot of 15 imported birds, were inoculated with 1 c. c. each of our 1609 Kikuyu Fowl Disease vaccine strain.

The imported birds comprised Indian game, English game, White Sussex, hens and cocks.

The results of these inoculations were as follows.—

(a). Fifteen birds *i.e.*, 30.6% of the half breeds gave a temperature reaction to the inoculation, with clinical symptoms, and of these, 3 birds, *i.e.* 6.1% died.

(b). Two birds *i.e.*, 13.3% of the imported birds shewed a temperature reaction to the inoculation, with no clinical symptoms, and there were no deaths.

It would appear from these results that the local half bred birds are more susceptible to the vaccination than are the imported birds.

FIELD INVESTIGATIONS.

Officers of the Laboratory visited the following places in connection with investigations of disease:—Kijabe, M'bagathi, Kima, Gilgil, Nakuru, Naivasha, Uplands.

INSTRUCTIONAL.

The following members of the Field Staff were attached to the Laboratory for varying periods during the year:—

Mr. E. A. Wilshaw	...	Veterinary Officer.
Mr. G. B. Purvis	...	" "
Mr. R. L. Scott Little	...	" "
Mr. D. Wyartt	...	Stock Inspector.
Mr. J. Mc. Kay	...	"
Mr. T. Harris	...	"
Mr. F. T. O'Meagher	...	"
Mr. J. F. Greig	...	"

LIBRARY AND MUSEUM.

The Library now contains 965 bound Books of Reference, and a large collection of Scientific papers and journals. It is desirable that all these be card indexed to facilitate ready reference to the most recent literature on any given disease, but unfortunately, owing to retrenchment of staff, it has not yet been found possible to carry out this work.

It is highly desirable that an Institution of this kind should possess a museum for the preservation and exhibition of specimens for educational and demonstration purposes. One of the rooms of the Laboratory has been set aside for this purpose, and a small collection of specimens already exists, but here again, owing to shortage of staff, it has been found impossible to preserve and mount the many interesting pathological specimens which become available from time to time.

VISITORS.

Dr. Sir Arnold Theiler, K. C. M. G., Director of Veterinary Education and Research, Onderstepoort Laboratory, Pretoria, South Africa, visited Kenya Colony in March, whilst en route South Africa. Sir Arnold Theiler, during his stay in the Colony, paid several visits to the Laboratory, and very kindly assisted the Veterinary Services of the Colony in entering into discussions with the Chief Veterinary Officer and myself regarding the combatting of the more serious stock diseases of this Colony.

During the same month we were honoured with a visit from His Excellency Sir Robert Coryndon, who was accompanied by Lady Coryndon.

Their Excellencies spent a considerable time in inspecting the Livestock here and also visited the Engine-House and made an inspection of the Plant there, and evinced considerable interest in the working of the Laboratory and the methods in use.

On the 10th November, the East African Parliamentary Commission visited the Laboratory, and took considerable interest in the methods employed for combatting the more prevalent stock diseases that are of economic importance to Kenya Colony.

Personal.—The Staff, both Professional and Lay, have carried out their duties with loyalty and devotion, for which I desire to record my highest appreciation, more especially as considerable shortage of Staff has been experienced.

I have the honour to be,

Sir,

Your obedient servant,

J. WALKER.

Chief Veterinary Research Officer.

APPENDIX "E".

ANNUAL REPORT
OF THE
AGRICULTURAL CHEMIST
FOR THE
YEAR ENDING DECEMBER 31st, 1924.

Ref. 12/1/25. 27.

22nd January, 1925.

THE HON'BLE THE DIRECTOR OF AGRICULTURE,
NAIROBI.

SIR,

I have the honour to submit herewith the Annual Report of the Chemical Division for the year 1924.

STAFF.

The whole staff of the Division was appointed during the year and is constituted as follows;—

Mr. V. A. Beckley, M.C., M.A., A.I.C. Agricultural Chemist, assumed duties on 17th December.

Mr. M. H. Fox, B.Sc., A.I.C. Chemical Officer, transferred from Chemical Research Department on 1st January.

Mr. B. A. Pickering, Junior Clerk, appointed on 14th January.

CORRESPONDENCE.

676 letters have been dealt with; of these 441 have been inward letters and 235 have been outward letters.

In addition 544 reports on samples have been issued.

Quite half the letters received referred to dip matters; other branches of agricultural chemical work were dealt with to a very small extent.

WORK DONE.

The work of the Division was purely routine in character, consisting in the examination and analysis of samples received. 588 samples were received during the year, of these 544 have

been examined and reported upon. The main heads, under which the reports fall, are given in the Summary below :—

Dips	...	...	469
Soils	...	..	4
Insecticides and fungicides	...		11
Toxicological	...	...	21
Wire worm remedy	...		15
Miscellaneous	...	...	24

GENERAL.

Since the undersigned assumed duty so late in the year, it is not possible to give a detailed account of the Division during the year.

From January to April the work of the Division was conducted by the Chemical Officer in the Laboratories of the Chemical Research Department by kind permission of the Government Analyst.

During April the equipping of the Chemical Laboratories at the Scott Agricultural Laboratories was commenced. It was not possible for regular work to be conducted before July. Since then the Chemical Division has gradually become more prepared to conduct agricultural chemical work.

I have the honour to be,

Sir,

Your obedient servant,

V. A. BECKLEY,

Agricultural Chemist.

APPENDIX "F."

ANNUAL REPORT
OF THE
ENTOMOLOGIST
FOR THE
YEAR ENDING DECEMBER 31ST, 1924.

DEPARTMENT OF AGRICULTURE,

Scott Agricultural Laboratories,

31st December, 1924.

THE HONOURABLE

THE DIRECTOR OF AGRICULTURE.

SIR,

I have the honour to submit, herewith, a Report on the work done during the year ending 31st December, 1924.

STAFF CHANGES.—

Mr. B. F. Ratcliffe, Junior Clerk, has been transferred to the Office of the Grader, Mombasa, and his place has been taken by Mr. A. C. E. Gaitskell.

TRAVELLING.—

2,654 miles were travelled by car on Government Service.

CORRESPONDENCE.—

The number of letters dealt with has increased considerably, 1,675 as against 1,041 last year; the subjects are summarised as follows.—

Bees and Wax	...	...	33
Bloodsucking Flies and Ectoparasites	...	...	44
Citrus	...	...	18
Coconuts	...	...	1
Coffee	...	...	595
Cotton	...	...	15
Flowers	...	...	4
Fruit Trees	...	...	15
General	...	...	203

Household Insects	...	...	4
Identification of Insects	...	...	56
Importation of Plants	...	...	282
Maize	...	...	25
Sericulture	...	...	102
Staff	...	...	78
Stored Products	...	...	26
Upkeep of Laboratory	...	...	158
Vegetables	...	...	2
Wheat	...	...	14

1,675.

PUBLICATIONS —

1. The Coffee Mealybug. (Local Press).
2. Notes on the Biological Control of the Coffee Mealybug (Local Press.)
3. A list of Bloodsucking Flies and their Allies in Kenya Colony and Protectorate (Supplement to the Medical Journal, August).
4. Ectoparasites recorded from Kenya Colony and Protectorate, with their hosts. (Supplement to Medical Journal, September).

SERICULTURE.—

No further experimental work has been undertaken during the year, as the mulberry transplanted from Kabete has not yet advanced sufficiently to give the requisite quantity of leaf.

The cocoons and reeled silk, exhibited in the Kenya section at Wembley, were very favourably reported on.

ROUTINE.—

1. During the year 1,063 parcels or packages of imported seeds and plants have been examined at Head Office, G. P. O. and Railway Station.
2. 509 applications for permits to import plants and seeds have been scrutinized, passed or amended.
3. 184 specimens of insects, damaged plants, seeds, etc., sent in by Planters have been examined and reported on.
4. Exhibits were prepared for the Native Agricultural Show, Kavirondo, and for the Agricultural Society Show at Nakuru.
5. The following meetings were attended :—

Coffee Planters, Ruiru	...	16-4-24.
Coffee Planters, Kyambu	...	25-4-24.
Coffee Planters, Makuyu	...	28-4-24.
Coffee Planters, Union	...	19-5-24.
Maize Conference	...	11-12-24.

6. The collections have been kept in good order and the Entomological Record for the year is appended.

ARTIFICIAL DRYING OF MAIZE.

The maize exhibits for Wembley and the maize used to make up the standard grade samples were artificially dried to ensure their keeping qualities, and to kill any weevils, grubs and eggs which might be present and also to guard against reinfestation by weevil.

The first experiments were conducted at the Kahawa Coffee Factory in Gordon Coffee drier. The conditions were not ideal but no other plant was available.

The original temperature of the maize was 72° F. This was put into the drier at 9.50 a.m. the temperature of the hot air entering the drier being 145° F. At 10.30 a.m. the temperature of the maize was 110° F., at 10.50 a.m. 125° F., at 11.10 a.m. 135° F. The maize was left at this temperature for 5 minutes. All the exhibits and different grades were put through in a similar manner without detriment to the grain. One year afterwards the treated maize was again examined and showed no signs whatever of weevil.

INSECTS OF ECONOMIC IMPORTANCE DURING THE YEAR ON COFFEE.

1. *Antestia lineatocollis*.—Stal. The coffee bug.

Several outbreaks have been reported but the amount of damage done seems to have been much less than last year. It is noticeable that less damage is done when the coffee is properly shaded.

2. *Pseudococcus citri*.—Risso. Coffee Mealybug.

This species was first recorded from the Kikuyu country in 1909 and from the Old Government Farm, Fort Hall Road, in 1913. In those days little attention was paid to this insect as a coffee pest; few bushes were affected, the damage done was slight and the pest did not spread.

Recently, however, in the Ruiru and Thika areas the bug has spread to an alarming extent and in some cases as much as 50% of the crop has been lost. The actual loss is difficult to estimate as contributing factors were lack of sufficient labour and a partial failure of the rains.

This mealybug is a rather omnivorous feeder and, besides coffee, it has been reported on ;—Oleander, Makinduri, Makuyu,

Kapok, Mulberry, Mahuti, Cosmos, Ficus sp., Crotons, Black-jacks, *Cajanus indicus*.

There are continuous overlapping generations throughout the year.

The young growing points are covered with clusters of the scales, the juices are sucked and the tips wither and die back. The insects congregate in myriads in the flower clusters and clusters of young berries with the result that in many instances the fruit does not set and, if the young berries do form, the juice is sucked from the pedicels and the berries turn black and fall off.

After a bad attack the bushes become covered with a black fungus, living on the honey dew, primaries and laterals die back and the bush has neither leaves nor fruit.

The wind is the medium which is to a great extent responsible for the spread of the insect. The young larvae and the fluffy egg-masses, together with leaves on which there are live insects, are carried for considerable distances by "dust devils".

Birds, pruners, and pickers carry the scales from bush to bush.

Several species of ladybird beetles have been found feeding on the mealybug but these are not at present in sufficient numbers to be an efficient control.

A species of Psocid is a very effective natural control given suitable climatic conditions. Bright dry weather favours its increase whereas in rainy weather this is checked, most of the young Psocids being drowned.

Methylated spirit or magadi mixture, applied with small brushes, is distinctly useful but it must be acknowledged that all attempts at mechanical control have proved only moderately successful and very costly owing to water shortage, labour, etc.

Many different sprays and dusts have been experimented with and although some of these have given temporary relief this is, as a general rule, for such a short period and at such a cost as to render treatment almost impracticable on a large scale.

A small colony of "The Mealybug Destroyer", *Cryptolaemus montrouzieri*.—Muls., was received from Mr. C. W. Mally, Senior Entomologist, Cape Province, South Africa. This arrived in October. Although the original adults had died on the voyage, 144 larvæ were brought to maturity. From these by the end of the year, 2,900 larvæ had been obtained and moreover, the adults are still alive and egg-laying.

Arrangements have been made for the introduction of the Sicilian Mealybug Parasite—*Tanaomastix abnormis*, Girault.

In California, "This parasite takes very kindly to domestication and is a very satisfactory insect with which to work, since it is not affected adversely by confinement. It is industrious in its habits and swarms about over infested fruit and plants in a businesslike manner, keeping constantly on the move in its search for a suitable host. It is not easily disturbed and will not fly unless forced to do so. In the orchards where it has become established one to a dozen may be found upon a leaf, where they are continually seeking young mealybugs."

In most infested plantations, ants are in attendance on the mealybug. Whether they actually spread the scale is doubtful but they certainly interfere with the beneficial work of the ladybird larvæ. The females of *Tanaomastix* deposit the eggs in the young mealybugs. On hatching, the larvæ feed on the body of the scale and pupate under the skin of the mealybug. They are therefore protected from the ants from egg to adult. The adults are active, and commence egg-laying almost immediately after hatching and are not deterred by the ants. Should the introduction be successful this parasite promises to be of a very great value in the control of the mealybug.

Experiments in banding against the ants and in poisoning the ants are being conducted. In this connection a new device, invented by Mr. Reid, and supplied by Messrs. G. H. Williamson and Sons, Ltd., Worcester, is being tried.

3. The other Coccids reported were :—

Ceroplastes ceriferus, And.

Coccus Africanus, Newst.

Asterolecanium coffeae, Newst.

Pseudococcus virgatus, Ckl.

Pseudococcus maritimus, Erk.

Pseudococcus perniciosus, N. and W.

Icerya ni groareolata, Newst.

4. Borers :—

These have not been much in evidence during the year and have been controlled by the usual injection of a few drops of carbon bisulphide.

The coffee berry-borer, *Stephanoderes hampei*, Fer., which has recently been discovered doing great damage in Brazil and which is present in Uganda has not yet been found in this Colony. After my visit to Uganda in 1908, all Uganda coffee, except in transit, was prohibited entry to Kenya. The strict

enforcement of the regulations by the Customs Authorities and Officers of the Department of Agriculture has been successful, to date, in preventing the introduction of this pest to the coffee plantations here.

5. Leaf-eating Insects :—

- a. *Metadrepana andersoni*. Tams, has been reported from two localities.
- b. *Parasa vivida*. Wlk.—The Stinging Caterpillar, was forwarded from the Kyambu area.
- c. The caterpillar of a *Sphyngid* was reported as eating leaves in the Koru area.
- d. *Zonocerus variegatus*. Linn, and *Zonocerus elegans*. Thb., The nymphs of these two Acridiids were responsible for the defoliation of a considerable portion of two nurseries.
- e. Leaf-eating beetles—*Gonocephalum simplex* and *Systates* spp. have again been reported from different areas, though the damage done has been slight.

6. Thrips :—*Diarthrothrips coffeae*. Will.

Two outbreaks were reported and the spread was arrested by spraying thoroughly with a weak solution of lime-sulphur, i.e., 1·007 sp. gr.

7. *Cutworms*.—Painting the stems with a weather-proof whitewash has given better results than the collars. Many washes have been experimented with and the paint used in California has proved the most durable. This is prepared as follows :—

WEATHERPROOF WHITEWASH.

(1)	Quick lime	...	...	62 lbs.
	Water (hot)	...	...	12 gallons.
(2)	Common Salt	...	...	2 lbs.
	Sulphate of zinc	...	...	1 lb.
	Water (boiling)	...	...	2 gallons.
(3)	Skimmed milk	...	...	2 „

Slake the lime thoroughly in (1); dissolve the salt and sulphate of zinc in two gallons of water. (2); pour (2) into (1) and add (3). Mix thoroughly. Two pounds of flour paste (dissolved in 2 gallons of hot water) may be used instead of the skimmed milk.

ON COTTON.

Aphis gossypii, Glover, the Cotton Aphis and stainers.

Dysdercus, spp. have been reported from Kavirondo.

I have the honour to be,

Sir,

Your obedient servant,

THOS. J. ANDERSON,

Entomologist.

ENTOMOLOGICAL RECORD FOR THE YEAR 1924.

We are again indebted to the Imperial Bureau of Entomology for the identification of the many insect specimens sent home.

The Staphylinidae were identified by Bernhaur and the Longicorns by Aurivillius. The great majority of the species were previously unrepresented in the British Museum collections, many being new to Science.

The Anthomyiidae were worked out by Mr. J. R. Mallach, Bureau of Biological Survey, Washington, D. C., and descriptions were published in the Annals and Magazine of Natural History. The uniques have been handed over to the British Museum.

The two new Moths have been described by Mr. H. T. Tams.

COLEOPTERA.

STAPHYLINIDAE

Philonthus bisignatus, Boh.

Philonthus abessinus, Fauv.

Zyras laminatus, Roth—new to B. M.

Paederus bayeri, Bernh var?—new to B. M.

COCCINELLIDAE

Chilocorus angolensis, Crotch (Feeding *P. citri*.)

Hyperasnia senegalensis, Muls—feeding on *Pseudococcus citri*.

CERAMBYCIDAE

Calanthemis hauseri, Jord—new to B. M.

Callichroma fragrans, Dalm var *branchi*? Auriv, new to B. M.

Nisoemes clavipes, Kolbe—new to B. M.

LAMIIDAE

Ceropalesis fullax, Per?

Ceropalesis 5 fasciata, F.

- Ceropalesis rubrivariae gata*, Aur—Type new to B. M.
Ceropalesis intermedia, Aur—Type new to B. M.
Tragocephala chloe, Thoms? new to B. M.
Blepisanis insignis var nigripes, Auriv—new to B. M.
Dyenmonus confusus, Auriv—new to B. M.
Hypeschrus strigatus, Gyll—new to B. M.
Stenidia floccifera, Kolbe? var—new to B. M.
Dinocephalus nigroannulatus, Auriv—new to B. M.
Chariesthes nigroguttata, Auriv—new to B. M.
Dichostathes trilineatus, Hintz—new to B. M.

RHYNCHOTA.

COCCIDAE

- Icerya nigroaeolata*, Newst. (on Coffee).
Asterolecanium bambusae, Boised.
Pseudococcus virgatus, Ckll. (on Coffee).
Ceroplastes ceriferus, Anders. (on *Thevetia nereiiifolia*)

LEPIDOPTERA.

LIPARIDAE

- Nygnia sericaria*, Tams, sp. Nov. (wild silk moth).
 described by W. H. T. Tams in the Annals and
 Magazine of Natural History. No. 82. October,
 1924.

DREPANIDAE

- Metadrepana andersoni*, Tams sp. Nov. (caterpillers
 defoliate Coffee).

Described in the Bulletin of Entomological Research Vol.
 XV. Part 3.

DIPTERA.

ANTOMYIIDAE

- Hylemyia andersoni*, Mall. sp. Nov. Type.
Hylemyia vittithorax, Stn—new to B. M.

Hylemyia ventralis, Stn—new to B. M.

Hylemyia capensis, Mall—new to B. M.

Anthomyia spinigera, Mall—new to B. M.

Emmesomyia maculithorax Stn—new to B. M.

HYMENOPTERA.

FORMICIDAE

Pheidola punctulata, Mayr. in association with *Pseudococcus qitri* on coffee.

Messor cephalotes, Em., subsp. *plinii*, Santo new to B. M.

APPENDIX "G".

ANNUAL REPORT
OF THE
MYCOLOGIST FOR THE YEAR 1924.

Ref. No. 1/2.

30th January, 1925.

THE HON'BLE,

THE DIRECTOR OF AGRICULTURE,

NAIROBI.

SIR,

I have the honour herewith to submit my Annual Report for the year, 1924.

STAFF.—

Mr. F. W. Evans, Junior Clerk, proceeded to Headquarters on June 9th, for temporary duty prior to going on home leave.

TRAVELLING.—

I was absent from Nairobi on duty for 53 days during the year. 4,000 miles were covered on Government Service and 61 visits to farms were made.

The greater part of the travelling is accounted for as follows:—

January	... Agricultural Show at Nakuru.
Feb.—March	... To Turbo Valley in connection with Coffee Berry Disease Investigations.
March	... To Coast investigating Disease of Coconuts.
May	... To Voi investigating Disease of Sisal.
June—July	... To Turbo Valley in connection with Coffee Berry Disease Investigations.
Sept.—October	To Uasin Gishu, Trans Nzoia and Kipkarren Districts in connection with Coffee Berry Disease and Diseases of Maize.

CORRESPONDENCE.—

Inward letters numbered 502 ; outward letters 351.

Numerous enquiries from farmers were dealt with. These were mostly concerned with diseases of crops and were generally

accompanied by specimens for examination. While these enquiries covered a range of 28 different hosts, nearly half were accounted for by coffee.

Information was also supplied on a number of purely botanical subjects mainly connected with the identification of indigenous plants believed to be important either for their uses or, on account of their injurious properties.

A considerable correspondence was exchanged with scientists in other countries in order to keep in touch with the latest aspects of disease investigations. In this connection acknowledgment must be made of the valuable services rendered by the Imperial Bureau of Mycology in London.

EXPERIMENTAL WORK.

During the year under review considerable progress was made in the investigation of the Coffee Berry Disease and its control. In June inoculation experiments were carried out in the affected district as a result of which the disease was proved to be due to the fungus mentioned in last year's report as being under strong suspicion. Hundreds of healthy berries were inoculated with this fungus and two other fungi which were regarded as possible causes of the disease. In the case of the first fungus a large percentage of the berries showed typical symptoms in from 6 days to a fortnight while results were entirely negative in the case of the other two fungi.

As the result of investigations in the laboratory extending over many months the identity of the fungus which gave the above positive results is considered established as a strain of *Colletotrichum coffeanum* differing from that commonly met with in the Colony as the cause of Brown Blight and other minor coffee maladies.

With regard to the control of the disease numerous spraying experiments were carried out in Turbo Valley district, as a result of which a spraying programme has been evolved which, it is believed, will result in considerably decreasing the ravages of the disease if carried out thoroughly and completely. A series of manurial experiments is contemplated for 1925 to test the effectiveness of that line of treatment.

The inoculations and spraying experiments mentioned above were carried out respectively at Elgon Estates (by permission of Mr. H. C. Potter) and at Mr. L. A. Johnson's farm, Turbo Valley. Acknowledgment must be made of the invaluable services rendered by these two gentlemen.

A disease of Coconuts, causing splitting of the husk accompanied by exudation of gum, was reported from the Coast early in the year and was under investigation for some time. It was finally concluded that the trouble was nonparasitic and due to

unfavourable soil conditions during a spell of dry weather. Enquiries as to whether the malady was known, were addressed to plant pathologists in several other coconut-growing countries but replies were negative except in the case of Tanganyika Territory where the disease is also known to occur during dry weather.

A pink mouldiness of maize cobs was reported from Nakuru district in May and is evidently fairly general throughout the country. It varies in severity, however, with the district and the variety grown, those varieties being most affected which have large cobs with a tendency to premature opening of the sheaths. A species of *Fusarium* was readily isolated from diseased maize seeds and subsequent inoculations established its pathogenicity. Cultures of the fungus were sent to the Imperial Bureau of Mycology for examination and a reply was received that the *Fusarium* is probably a stage in the life history of *Gibberella saubinetii*, a well-known parasite of cereals in other countries. Search is now being made for the later stage, to establish definitely the identity of the fungus. Measures are being taken by the Plant Breeder to discover whether the disease can be minimised by seed selection.

In February numerous apple trees were reported to be dying in an orchard in the Thika district. Examination showed that the roots of all the dead trees were infested with white ants and that some bore fructifications of *Botryodiplodia theobromae*, a fungus which is known on a wide range of hosts, but usually only as a weak parasite, requiring lowered resistance of the host to make attack possible. To test the parasitism of the fungus on apple, a number of young trees of the same variety as those affected in the orchard were inoculated in April, both on injured and uninjured roots. At the end of the year, however, none had died and it seems probable, therefore, that the fungus was not the primary cause of disease in the orchard.

A case of damping-off of coffee seedlings was noted in a nursery at Kabete in August. In the laboratory a fungus was developed in culture from the roots and inoculation experiments were begun to test its parasitism on coffee seedlings. At the time of writing this report the work has not progressed sufficiently to give results. By a coincidence within a few weeks of the discovery of the damping-off of the coffee seedlings, a root disease of strawberries was reported from Kyambu and what appears to be the same fungus was isolated from the strawberry roots. The fungus has since been tentatively identified by the Imperial Bureau of Mycology as *Rhizoctonia solani*, the cause of a well-known disease of potatoes in other countries.

Two samples of lime were tested, for spray-making purposes during the year. One, a sample of quicklime from Nairobi, was found satisfactory for making all sprays requiring quicklime

but the other, from the Uasin Gishu district, was of only limited use. If properly burned, however, it would evidently be very useful as a source of supply for spray-making in the districts affected with Coffee Berry Disease.

As the result of correspondence and exchange of specimens with Dr. Small, the mycologist in Uganda, one of the root diseases of Kenya coffee has been established as due to *Rhizoctonia lamellifera*, a fungus recently discovered by him and described as new to science.

A small plot of Broom Corn (*Andropogon Serghum*) at the Scott Agricultural Laboratories was found in November to be heavily infected with Smut (*Sphacelotheca Sorghi*). Experiments are in hand to discover whether the closely related native *mtama* is subject to this disease.

Owing to the pressure of more important work, little progress has been made with the investigation of the bean disease (*Vermicularia capsici*?) and Kaffir Corn disease (*Cerebella Sorghi-vulgaris*) mentioned in the report for 1923. Attempts, however, to inoculate the latter into local *mtamas* and Kaffir Corn indicate that the fungus may not be actually parasitic on these cereals at all but that it lives on a sugary liquid excreted from the heads under certain conditions not yet fully understood.

ROUTINE WORK.

In connection with the Nakuru Agricultural Show in January an exhibit showing many of the principle diseases of Kenya crops was prepared and staged.

At the Annual General Meeting of the Coffee Planters' Union held in May an address was given on the subject of Pink Disease in Coffee.

A statement giving the latest information with regard to Coffee Berry Disease was prepared for publication in the local press in December.

About 100 specimens of flowering-plants, collected during various tours in the country districts, duplicates of which had been authentically named by the Royal Botanic Gardens, Kew, were classified and added to the Botanical Herbarium at the Scott Agricultural Laboratories.

Numerous consignments of plants and seeds imported into Kenya were examined on arrival at the General Post Office, Nairobi, and elsewhere.

GENERAL OBSERVATIONS AND REMARKS.

The following diseases were noted or definitely identified for the first time in Kenya during 1924 :—

COFFEE.	Root Disease.	Rhizoctonia lamellifera Small.
	Seedling Disease.	Rhizoctonia sp. (? R. solani Kuhn).
MAIZE.	Leaf Blight.	Helminthosporium turcicum Pass.
	Cob Rot.	Fusarium sp. (?—Gibberella saubinetii (Durien and Mont.) Sacc.).
BROOM CORN.	Smut.	Sphacelotheca Sorghi (Lk.) Clinton.
COCONUT.	On Nuts and Leaves.	Pestalotzia palmarum Cke.
TOBACCO.	Leaf Spot.	Cercospora Nicotianae E. and E.
QUINCE.	Bitter Rot.	Gloeosporium rufomaculans (Berk.) Thum.
STRAWBERRY.	Root Disease.	Rhizoctonia sp. (R. solani Kuhn).
SESBANIA SP.	On Twig.	Tubercularia sp.
	On Broken Branches.	Poria sp.
TOMATO.	Leaf Spot.	Septoria Lycopersici Speg.

Of the new diseases reported above the most important from the point of view of the damage done is the Maize Cob Rot. A diseased seed from a cob which had been in a dry storage crib for 11 months and had afterwards been kept under dry conditions in the laboratory for a further 2 months gave a vigorous growth of the fungus in artificial culture at the end of this period. It is therefore obvious that the fungus possesses the faculty of remaining alive for a considerable time under conditions unsuited to active growth and farmers are accordingly being warned to burn all refuse after harvesting the crop.

The Maize Leaf Blight sometimes causes an appreciable diminution of crop in late plantings of certain varieties. There seems to be a certain amount of evidence that the Natal White Horse Tooth variety, which in South Africa is considered highly resistant to the disease, retains the same quality in Kenya.

The Coffee Berry Disease which has caused so much damage in past years does not seem to have spread beyond the previously affected area.

Specimens showing an interesting case of parasitism by a flowering-plant were received from Muhoroni whence it was reported that wherever a certain weed was noticed the sugarcane growing in its vicinity was sickly. In the laboratory the weed was identified as *Striga Hermonthica* and it was readily established that the roots of the latter were in intimate connection with those of the cane from which nourishment was being extracted by means of haustoria or suckers. A number of Kavirondo natives who were questioned stated that they knew the weed well and that, with the exception of beans, none of their crops would grow where it existed.

I have the honour to be,

Sir,

Your obedient servant,

J. McDONALD,

Mycologist.

APPENDIX "H".

ANNUAL REPORT FOR 1924.

SCOTT AGRICULTURAL LABORATORIES,
NAIROBI.

P. O. Box No. 323.

January 27th, 1925.

In reply please quote Ref. 5/2 and date.

THE HON'BLE,

THE DIRECTOR OF AGRICULTURE,

NAIROBI.

SIR,

I have the honour herewith to submit my report for the year 1924.

STAFF CHANGES.

I returned from leave at the end of January. Mr. E. V. Stobbs, Junior Clerk, left the service in April. Mr. R. N. Noble took up his duties as Junior Clerk on June 1st.

TRAVELLING.

I travelled approximately 5,500 miles during the year and was absent from my station for 120 days.

The work done during my travels will appear in other parts of this report.

CORRESPONDENCE.

In. 128 letters.

Out. 168 letters.

EXPERIMENTAL WORK AT THE HENRY SCOTT AGRICULTURAL LABORATORIES.

The breeding cage was filled with F2 and F3 families of previous crosses which have since been selected and harvested. Outside the cage were sown some promising selection from a natural South African hybrid, as were also certain pure-line selections of which there was not a sufficient quantity of seed to sow in rod-rows. One of these latter is extremely promising.

In all, about 40,000 grains were separately sown by hand, and all promising material amongst the resultant plants has been selected out and separately harvested.

Five hundred and twenty pure-line varieties of wheat (known as "Kabete" varieties, and which are selections from the original mixtures of 1921) were sown in triple rod-rows triplicate and also in multiplication plots occupying about 10 acres. Their yields at harvest were accurately taken, and on account of this and of the notes taken on the plants during growth and on the grain after harvest during the last three years, the "Kabete" varieties have now been reduced to about eighty-five. Some were discarded and some were mixed together as being identical. These eighty-five varieties have again been sown in triple rod-rows in triplicate during the short rains season at the H. S. A. L.

Beginning with a few grains of seed in 1922 these "Kabete" varieties have been multiplied as quickly as possible during the last two years. Although handicapped by bad seasons at Kabete and the H. S. A. L. we are now in possession of quantities of seed of these 85 varieties ranging from a few ounces to 250 lbs. A portion each of some half-dozen of these varieties were sown for multiplication on Kabete Reformatory land in November.

Droop wheat. A new wheat, which I have called Droop, has been issued to farmers this year. This wheat originated in the following manner:—

Amongst several of the mixed varieties of wheat which I grew at Kabete in 1921 there appeared several plants of a beardless, lax-eared wheat showing marked chlorosis of the leaves. This type was outstandingly resistant to all three rusts. About seventy plants of this type were collected, kept separate and grown on in 1922 and 1923. By 1923 certain differences were noticeable between the pure-line. About 50 of them were identical in every respect, were lumped together and issued as Droop wheat. Owing to the scarcity of land in possession of this Department, Mr. Harold Hill of Machakos very kindly consented under certain conditions to multiply the remaining 22 pure-lines in 1924. Ten of these pure-lines were identical and are being issued as Droop Selected No. 1. A further six have been lumped together and are being issued as Droop Selected No. 2. The remaining six have been lumped together and are being issued as Droop Selected No. 3. The fifty original pure-lines issued together as ordinary Droop were grown at the H. S. A. L. in 1924 and it was seen that one of them (No. 63) was a very much higher yielder and stronger grower than the remainder. On the other hand it is far more susceptible at the H. S. A. L. to the rust *puccinia Triticina* than are the rest. This No. 63 is being multiplied now and may be issued as Droop No. 4.

The chief differences (apart from Botanical characters) between these "Droops" are as follows:—

Droop Selected No. 1. is purer than Droop.

Droop Selected No. 2. is about a week earlier ripening than No. 1.

Droop Selected No. 3 is as early as No. 2 but probably a higher yielder.

Droop Selected No. 4 is certainly the strongest grower of the lot, but may have to be condemned on account of susceptibility to *Puccinia Triticina*.

Early maturity is of great importance in the Machakos area.

The chief characteristics of Droop are as follows:—

(a) *In the flowering stage*

Grey—green colour. Long, narrow, scanty leaves.

Purple auricles. Poor tillering powers.

Marked chlorosis of the leaves (speckled white).

Resistant to *Puccinia Graminis* and *Puccinia Triticina*.

Increasingly susceptible to *Puccinia Glumarum* at altitudes rising from 7,000 ft. to 10,000ft.

(b) *When Ripe.*

Almost beardless. Lax ear. White chaff.

The ear hangs over. Thin, weak straw.

Usually 2—3 grains per spikelet.

Loose chaff, which inclines the grain to shatter.

The grain is white, soft long and narrowish and an ugly shape. Bushel weight usually about 62 lbs.

I do not consider the grain very suitable for export purposes, nor do I particularly like the wheat. It was the first available wheat and I have issued it because parts of the country are urgently in need of a rust-resistant wheat and the millers want a soft wheat to blend with Equator.

It is interesting to note that on Major Knapman's farm, Trans Nozia, during this year.

Equator gave a yield of 6 bags to the acre.

Cross XI gave a yield of 8 bags to the acre.

Droop gave a yield of $9\frac{1}{2}$ bags to the acre.

Experimental work at Natai Emuin Farm, Njoro.

In the breeding cage were sown the F2 families of crosses which I made in the past. These have been harvested. The

crosses were made with the definite object of producing a good wheat resistant both to *Puccinia Glumarum* and *Puccinia Graminis*.

In the cage and in large quantities outside it were sown selections from the progeny of a natural South African hybrid. In all about 40,000 grains were separately sown by hand.

During the years 1921 and 1922 all the available "Kabete" varieties were grown at Njoro. They were given different numbers and are now known as "Njoro" varieties. These "Njoro" varieties originally numbered some 500. During the years 1921—1923 all those varieties showing signs of susceptibility to *Puccinia Glumarum* and/or *Puccinia Graminis* were discarded. By the end of 1923 only 200 remained of the original varieties but 56 more had been freshly introduced for experiment. They were sown this year in rod-rows and in multiplication plots.

This has been a season of very severe drought at Njoro with consequently poor yields, and I have only been able approximately to double the seed of any variety. On the other hand it has been by far the most useful season since 1921 in respect of the appearance of *Puccinia Glumarum*. The majority of the original 200 varieties showed signs of susceptibility to it and were discarded, leaving now 23 "Njoro" varieties which will be issued as soon as sufficient seed is available. There are yet a further 27 "Njoro" varieties still very much in the experimental stage. The quantity of seed now in my possession of any "Njoro" variety varies from a few ounces to 44 lbs.

Co-operative work with farmers on wheat.

I considered that sufficient seed of the "Kabete" varieties had been collected by the end of 1923 to try them out in different parts of the country during 1924. These experiments were conducted with the object of enabling me to decide which of the "Kabete" varieties were best suited to the different conditions of the various districts. I regard these experiments of the year 1924 as preliminary ones; the final and conclusive trials should be conducted in 1925.

About ninety "Kabete" varieties were chosen for the experiments, and these ninety were sown in each district in triple rod-rows in duplicate at a rate of about 50 lbs. to the acre each. The varieties chosen consisted for the most part of types highly resistant to *Puccinia Graminis* at Kabete, but a few were known to be very susceptible to that rust.

The districts chosen for the work were :—

Machakos.

West Kenia.

Tasin Gishu Plateau,
Trans Nzoia,
Solai Escarpment.
Keringet.

A very general statement is given below of the conclusions arrived at from the data furnished by the experiments in each district :—

(a) *Mr. Harold Hill's farm, Machakos.*

A considerable amount of wash occurred after the wheats were sown; this prevented the acquirement of any reliable figures of comparative yields. Several varieties (which unfortunately included Droop) were completely eaten down, except for an odd plant or two, by Spring-hares. It was almost impossible to make a comparison of rust-resistance with Droop.

There was no *Puccinia Glumarum*; *Puccinia Triticina* was present to the usual amount; *Puccinia Graminis* abounded. *Puccinia Graminis* attacked every useful agricultural variety. The varieties susceptible at Kabete were completely destroyed. The varieties resistant at Kabete showed varying degrees of resistance. The yields might have been slightly affected but the grain was plump. Several varieties seemed considerably more rust-resistant than Droop; it is difficult to be quite certain of this as the hares only left about one plant of Droop for examination.

It is going to be extremely difficult to find a variety of wheat really highly resistant to *Puccinia Graminis* at Machakos. On the other hand, during a rusty season, Droop and, in a greater degree, certain other varieties do not seem to be attacked at all severely by *Puccinia Graminis* until they are nearly ripe. By this time the rust can do little damage, and I am of the opinion that, unless something unforeseen happens, farmers in the Machakos area need never fear that they will lose more than 10% of their crop from the ravages of rust on any varieties of wheat recommended by this department. In this connection it should be borne in mind that varieties such as Florence are completely destroyed by *Puccinia Graminis* at Machakos as early as the flowering stage.

(b) *Mr. Vaughan Kenealy's farm, West Kenia.*

Again no reliable information could be obtained on comparative yields owing to the extreme variations in productivity of soil over very small areas.

This was largely due to the hurried preparation of the land. It can be said however that both the red and grey soils seemed suitable for wheat, the grey soil being rather the better of the two.

As far as rust is concerned the same remarks apply as to Machakos, with the difference that the attacks of *Puccinia Graminis* were not nearly so severe at West Kenia as at Machakos. This does not mean to say that they never could or will be so severe. The best West Kenia varieties were not in all cases identical with the best Machakos varieties.

(c) *Major Edward Pardoe's farm, Uasin Gishu Plateau.*

Yet once again the acquirement of reliable data on comparative fields was out of the question. In the majority of cases the germination was only about 20%, and the plants were very scraggy, short and weak. The probable cause of this was drought followed by very heavy rains on an extremely sandy and rather worked out soil. The rest of the field was barley which had suffered in exactly the same way except on ant-hills. On the remains of an ant-hill in the centre of the experimental wheat plot some of the varieties did extremely well considering the abnormal conditions under which they had to grow this year. These varieties yielded at a rate of between 7 and 8 bags per acre, showing that there are possibilities for wheat on suitable soils on the Plateau.

It will be readily understood that, under the circumstances, it was impossible to come to a definite conclusion as to which of these varieties were best for the Plateau. A good deal could be done by eye though, and about half the varieties were discarded and will not be tried again there. A certain amount of *Puccinia Triticina* was present, but there was no *Puccinia Glumarum* and no *Puccinia Graminis*.

(d) *Major Knapman's farm, Trans Nzoia.*

This experiment was an unqualified success. The germination was perfect in almost every case and the wheats grew under ideal conditions. All the promising wheats have been harvested. They have not been threshed and weighed as they have not yet arrived at the Scott Agricultural Laboratories. As far as the eye could tell, there were very definite differences in the productiveness of the varieties, and some of them appeared to be giving very profitable yields per acre.

There was a certain amount of *Puccinia Triticina* present, but there was no *Puccinia Glumarum* and no *Puccinia Graminis*.

(e) *Mr. W. G. Patten's farm, Solai Escarpment, Gilgil.*

And still once more no reliable information could be gained on the comparative yields of the varieties. Percentage germination was very low and varied enormously. The plants were generally stunted. This failure was due to a complete drought lasting for six weeks after the wheat was sown. The experiment however did not suffer by reason of this. It was obvious that every variety except three was susceptible to *Puccinia*.

Glumarum. Though their degrees of susceptibility varied I would not recommend any of them to be grown in the district as even a little Puccinia Glumarum is extraordinarily destructive once it gets into the ears. It is interesting to note that one of the three resistant varieties was Florence.

(f) *Powysland, Keringet, Molo. (Major Eric Pardoe).*

Germination, etc. was good. There was no Puccinia Graminis. There was a certain amount of Puccinia Triticina. Puccinia Glumarum attacked all the varieties here even more severely than at Gilgil. The same three varieties were resistant as at Gilgil.

The thanks of the Department and of wheat growers in general are due to the above gentlemen for the help they have given me and the interest they have taken in the work.

Co-operative work with farmers on Maize.

It was decided this year to start the improvement of the maize crop of the country. This was to be done by "selection in the field" in the Nakuru area.

The work was entrusted to the Flax Officer and myself. The following gentlemen kindly allowed us to operate on their farms and have given us all the assistance we required.

Mr. Oakes, Njoro; Mr. Proctor, Nakuru; Mr. Whitmore, Rongai; Mr. Wisdom, Solai; Mr. Cranswick, Solai;

About 750 plants were marked in each field while the plants were still green. These marked plants have since been harvested and they and their cobs kept separate from the rest of the crop. The cobs themselves now await selection. This will be done about the middle of February, 1925. The further stages of this work will be dealt with in my next Annual Report.

General Observations and remarks.

The experiments begun in 1921 and continued during the past three years on the main block of the selected "Kabete" and "Njoro" varieties of wheat are now nearing completion.

It is expected that by the end of 1925 the hoped-for results will be attained and that wheat growers will then be in possession of fair quantities of improved and pure wheat seed suitable both for export and for the local market.

The work has been hampered owing to a succession of bad seasons giving poor yields, by the depredations of vermin, etc. and by my absence on leave during 1923. Apart from the

breeding work a very great number of varieties has been kept going and kept pure year after year, so that, when sufficient quantities of seed had been collected to enable trials to be made in the different districts, I could feel perfectly satisfied that no stone had been left unturned to find a wheat suitable for every district. About 150 varieties have been imported, but only three have proved of any use.

The majority of the "Kabete" and "Njoro" varieties mature in $4\frac{1}{2}$ to 5 months at an altitude of 6,000 ft. The ears of most of them are inclined to shatter when ripe; the grain is in most cases attractive in appearance. No sound opinion can be given on their milling qualities until greater quantities of seed are available.

In the light of the knowledge gained by experiments during the past few years and during 1924 in particular, I am becoming more and more convinced that the presence of rust in this country is closely connected with altitude. Where rust is present some varieties are immune; some resistant in varying degrees and others susceptible in varying degrees. In districts where rust scarcely seems to exist either all varieties are resistant to those particular biologic or something inhibits the growth of the rust plant.

The facts at any rate are as follows:—

Puccinia Triticina is to be found everywhere, some varieties being resistant and some susceptible.

Puccinia Graminis is very severe at altitudes between about 4,500 ft. and 7,000 ft.

I have not yet observed *Puccinia Graminis* at altitudes of between about 8,000 ft. and 10,000 ft. except that once I saw a very little on some late volunteer Equator at Keringet, and a small quantity on some Florence near Gilgil.

Puccinia Glumarum is non-existent at altitudes between 5,500 ft. and 6,500 ft; it is present at 7,000 ft (except at Machakos) and becomes increasingly severe as the altitude rises towards 10,000 ft.

Puccinia Glumarum does not appear to attack wheat in the Uasin Gishu Plateau and Trans Nzoia areas. All wheats seem highly resistant to *Puccinia Graminis* in the Trans Nzoia and Eastern Plateau, where as this rust certainly attacks wheat in the Western Plateau.

Certain well known varieties behave in the following way:—

Florence is susceptible to *Puccinia Graminis* at Machakos, West Kenya and Njoro. It is resistant in the Trans Nzoia, on the Eastern Plateau, and fairly resistant on the Solai and Mau Escarpments. It is everywhere resistant to *Puccinia Glumarum*, being only slightly attacked on the Solai and Mau Escarpments.

In other words, I think Florence can be grown in the Trans Nzoia and Eastern Plateau and also possibly at altitudes over 8,000 ft., but nowhere else.

Exactly the same remarks apply to Equator as to Florence except that Equator seems immune to *Puccinia Glumarum* even at high altitudes. Equator however can only be grown where there is a long growing season. Marquis can probably be grown where Equator can, but I have no experience of it in the Trans Nzoia.

Droop is resistant to *Puccinia Graminis* everywhere, but less so at low altitudes than at high ones. It is not attacked by *Puccinia Glumarum* between about 5,500 ft. and 6,500 ft. nor in the Trans Nzoia and Eastern Plateau. It is susceptible to *Puccinia Glumarum* at Njoro and other altitudes of 7,000 ft. and over.

In other words, Droop can be grown at altitudes of between about 5,500 ft. and 6,500 ft. such as Machakos and West Kenia and also in the Trans Nzoia and Eastern Plateau, but nowhere else. It is not very severely attacked *Puccinia Glumarum* at 7,000 ft. but is very susceptible at 8,000 ft. and over.

Wheat in the Burnt Forest does not seem to be infected by *Puccinia Glumarum*, but some varieties are badly infected by *Puccinia Graminis*, probably due to the rich forest soil.

The "Kabete" varieties will be tested out again during 1925 at Machakos, West Kenia, on the Plateau and in the Trans Nzoia. Owing to the presence of *Puccinia Glumarum* at Gilgil and Keringet, only four "Kabete" varieties and all the "Njoro" varieties will be tried out at these two places.

The Plant Breeding Branch of this Department is and has been, very much handicapped by lack of land on which to grow wheat. This need has temporarily been met in the past by Mr. Harold Hill of Machakos and now by Major L. Knapman of Kitale who, at a financial loss to himself, has arranged to supply us with about 20 acres of land on which to multiply new varieties of wheat. He is also giving us sufficient labour to handle the crops. On his farm two seasons in the year can be used. The wheats will be sown in February, 1925, and harvested in June; they will be sown again in July, 1925, and harvested in November and should be ready for issue in fair quantity early in 1926.

It should be borne in mind that land is likely to be required year after year for the multiplication and renewal of varieties of wheat. Although farmers have in the past been very generous in their offers of land for the use of the Plant Breeding Branch, it is obvious that it would be better and the work would be more satisfactorily done if we had land of our own,

I have several times in the past stated my views on the subject of efficient and sufficient staff, also requisite land for the Plant Breeding Branch. I state them again now because the matter is becoming really urgent, and there are several crops besides wheat waiting for improvement in this Colony,

In a country of such varying climatic conditions as this one, Plant Breeding can roughly be divided into the following branches of work as regards wheat alone :—

- (a) The continued breeding, by hybridization, of improved pure varieties in at least two different districts.
- (b) A preliminary multiplication of these varieties coupled with yield trials.
- (c) A trial of these varieties (sometimes a hundred of them) in at least six other districts.
- (d) A further multiplication of the best varieties for each district up to a sufficient quantity for issue. About thirty acres of land should be reserved for this purpose.
- (e) As it is difficult for farmers to keep wheat pure, twenty acres are required for the continued renewal of the more important varieties.

(1) Some of the work, particularly that set out in paras. "d" and "e" does not properly belong to the province of the Plant Breeder himself and the performance of much of it is bound to interfere with his more specialised work.

(2) There should be someone capable of doing the routine work contained in paras. "a", "b" and "c" during the absence of the Plant Breeder, and also any other such work as may arise in connection with the improvement of other crops. It seems a pity, owing to lack of staff, not to be able to use his specialised knowledge on the improvement of these other crops.

Owing to financial stress it was not found possible to provide me with any assistance until the middle of 1923. I now have a part time European Junior Clerk and an educated native assistant.

They are both extraordinary useful to me and the amount of work carried out during the year under review could not have been done without their assistance. It is obvious however that a lot of the work not only requires more efficient assistance than they can provide but also that far more work of importance could be done had I the help of someone even only moderately trained in the profession of Agriculture.

I have the honour to be,

Sir,

Your obedient servant.

G. J. L. BURTON,

Plant Breeder.

APPENDIX "I".

DEPARTMENT OF AGRICULTURE,
NAIROBI.

14th February, 1925.

THE HONOURABLE,

THE DIRECTOR OF AGRICULTURE,

NAIROBI.

SIR,

I have the honour to submit my Annual Report for the year ending 31st December, 1924.

STAFF.

There are no changes to report, but an Inspector of Plantations was appointed during the year who has been assisting by inspecting coffee plantations.

TRAVELLING.

On the 22nd of February I left Nairobi for Mombasa and sailed for England on the 23rd February. I returned to Nairobi on the 13th October, having been away nearly 8 months. During the remaining 4 months under review I was absent from head office for 27 days. I travelled by car 924 miles on Government duty.

FIELD DEMONSTRATIONS.

Pruning demonstrations were given in Kyambu, Ruiru, Limuru and Solai.

INTERVIEWS.

I held in my office 232 interviews with coffee planters, merchants and visitors to the Colony. When in England I also held interviews with Merchants, Brokers and buyers interested in Kenya Coffee. I also attended the Kenya Court at Wembley and gave intending settlers advice regarding the prospects coffee growing in this Colony. Numerous enquiries were also dealt with by letter.

CORRESPONDENCE.

The correspondence included 166 letters dealing with the cultivation of the crop, diseases and pests, etc.

STATISTICAL RECORDS.

From Statistical information obtained as at the 30th June, 1924, the total area planted was 60,054 acres, of which there are up to 3 years of age 27,883

3—6 " " " 13,269
6 " and over 18,902

Total ... 60,054
 acres.

This figure shows an increase of 7,805 acres over last year's statistical return. The total production of clean coffee for the season 1923-24 (July—June) was 129,971 cwts. and "Buni" 14,981 cwts., giving a total of 144,952 cwts. The acreage and production are based on returns received from 585 Coffee planters.

INSPECTIONS.

The following is a summary of Districts visited, showing the number of plantations inspected, number of visits made and the number of plantations affected with Fungoid Diseases and Insect pests.

District.	Number of Plantations Inspected.	Second Visits.	Total number of Visits.	Leaf Disease.	Brown Blight on Berries.	Coffee berry disease.	Black Blight.	Borers.	Leaf Miner Moth.	Asterolecanium.	Green Scale.	Mealy Bug.	Antestia.	Cutworms.
Kyambu ...	17	1	18	10	3	...	4	1	17	...	4	3	...	1
Solai ...	12	1	13	7	7	...	2	...	12	...	2	1	...	...
Uasin Gishu	3	...	3	2	2	1	...	...	3	1	...	...	...	...
Trans Nzoia	3	...	3	3	3	...	...	...	3	1	...	...	...	...
Limuru ...	4	...	4	1	1	...	...	...	2	...	...	...	2	...
Subukia ...	2	...	2	...	...	...	1	...	...	...	1	...	...	...
Rongai ...	1	...	1	1	1	...	...	...	1	...	...	...	...	...
Nairobi ...	1	...	1	...	...	...	1	...	...	...	1	...	...	...
Total ...	43	2	45	24	17	1	8	1	38	1	8	4	2	1

Instructions under the Diseases of Plants Prevention Regulations 1924 have been issued to the occupiers of 17 plantations where neglected Coffee exists.

LEAF DISEASE.

With two exceptions, the 24 plantations reported with Leaf Disease was reported in a mild form.

The two Estates which were badly affected were in the Trans Nzoia.

BROWN BLIGHT ON BERRIES.

This disease causes a cementing of the pulp to the bean more especially when the cherries remain over ripe on the trees.

It is not usually very serious.

COFFEE BERRY DISEASE.

Although only reported on one plantation, this disease occurs on very many more Estates on the Plateau which are not included in the number of plantations inspected.

The Mycologist has succeeded in establishing its identity and has introduced satisfactory control measures.

BLACK BLIGHT.

Found on all coffee trees affected with scale. It disappears after the scale has been eradicated.

BORER.

The only case reported was found on the same plantation where it occurred several years ago.

LEAF MINER MOTH.

Is generally to be found in all the coffee districts but does not appear to do any material damage.

ASTEROLECANIUM.

This scale spreads very slowly but when a tree is affected it is difficult to eradicate.

Success has been obtained by washing the affected trees with Agrisol one in 25 parts water applied warm.

GREEN SCALE.

After last year's serious outbreak more attention has been given to spraying in consequence of which this pest is kept under control.

MEALY BUG.

During my absence on leave Mealy Bug has caused serious loss on a number of plantations, particularly in Ruiru and Thika Districts. It has spread not only from plantation to plantation but is reported in other districts. The Entomologist and Inspector of Plantations have been dealing with this outbreak.

ANTESTIA.

Besides the two plantations mentioned in my summary as having been affected with Antestia, there are many more estates which have suffered during the year from this pest.

CUTWORMS.

This pest is only reported in one case where damage to the young plants were noticed but it is safe to say that possibly 99% of new plantings have to be protected against cutworm damage.

Poison bait, cutworm paint as recommended by the Entomologist and shields are used as preventative measures.

EXPERIMENTAL.

Having been absent from the Colony for two thirds of the year I am not in a position to write fully regarding results on pruning on various systems and imported varieties of coffee.

From some observations made with regard to the Agobiada system I am more than satisfied with the present results. As to whether Agobiada should be adopted generally in preference to the four stem capping system needs further observations. I am of opinion however that the Central American system of pruning should be adopted in preference to the Single stem which is not an economical system where labour shortage exists.

The two stem system, which was tried at my suggestion, as planters were diffident about adopting the multiple stem, is not recommended for the following reasons.

If pruned on the single stem system it results in expensive pruning and if pruned on the Central American lines there is not sufficient upright growth to make up for the loss of the lower primaries which are cut away from time to time. From the result of trials carried out in converting single stem trees to the multiple stem, the best results are obtained if the tree is stumped and two or three shoots allowed to grow and capped at waist height, so as to get in the case of two shoots being left 4 heads, or in the case of 3 shoots 6 heads; where rainfall is deficient it might be advisable to adopt the four head method, and in districts where growth is slow it might not be advisable to cap but to establish 3 or 4 shoots similar to Agobiada.

SHADE.

In numerous cases temporary shade is being adopted where it would appear to be unnecessary as the growth of the coffee is normal and hail does not occur. In cases where temporary shade might be considered essential and "Sesbania" used, mistakes have been made in allowing the shade to get too thick either by not cutting away some of the branches or digging out alternate Sesbania trees from time to time. This tree is a very gross feeder but is most beneficial in certain districts if properly used.

VARIETIES PLANTED AT SCOTT AGRICULTURAL LABORATORIES.

A small area of coffee was planted at Scott Agricultural Laboratories in April, 1924, for the use of the Mycologist and Entomologist to carry out spraying and inoculation tests. The varieties planted are Jacksons Hybrid, Kents Arabica, Mocha and Blue Mountain.

The Jacksons and Kents plants were propagated from seed imported in 1923. With the exception of Kents Arabica, the following varieties were planted out in Nurseries in April :— Mocha, Blue Mountain, Mysore and Jacksons Hybrid.

Seeds of Jacksons Hybrid and Kents Arabica were imported from India, but Kents did not germinate at all; a fresh supply of this seed has been ordered from India.

The germination of the varieties planted out in nursery beds in April was most satisfactory.

GENERAL.

The labour shortage is becoming a serious question to the Coffee planter. In numerous cases a considerable amount of coffee turned into "Buni" and dropped on the ground from lack of pickers.

Dirty plantations were much in evidence, also due to shortage of labour.

More labour saving devices could be adopted, especially regarding the factory work. Picking coffee is still being carried out in a very crude manner, but nevertheless if more up-to date methods were adopted labour shortage would still be acute.

Ploughing between the rows of coffee once a year is being generally adopted with very good results.

While on leave in England, I attended the Kenya Court at the Empire Exhibition for about 2 months. The coffee exhibits received much attention and proved an excellent means of advertising "Kenya" coffee to the general Public.

Steps were taken with regard to establishing "Kenya" as the trade name for the coffee previously marketed as "Nairobi". The opinion of certain merchants, Brokers and Buyers was obtained and they considered that the change of name would not affect the sale of the coffee in any way, and that the present time was a good opportunity to make the change. This was subsequently done.

The rainfall for the year 1924 has been most unsatisfactory.

The quality of "Kenya" coffee would certainly have been considerably better had there been an average rainfall. However, in spite of this, high prices have been obtained. This is partly due to

- (a) The shortage in the supply of mild coffees,
- (b) Germany buying a considerable quantity of coffee during the early part of the year.
- (c) The advertisement which "Kenya" coffee had at Wembley Exhibition.

Kenya coffee has become very popular as a High Grade mild coffee and when there has been a shortage of Costa Rica coffee on the London Market "Kenya" coffee was used to make up the deficit.

The year's average price for "Kenya" coffee was £125/-per ton, this would be approximately equal to £108/-per ton local value. Stocks of mild coffees on the London Market are exceedingly low, consequently there is every reason to anticipate that the high price for coffee will continue for some time.

I have the honour to be,

Sir,

Your obedient Servant,

ARTHUR D. LE PIER TRENCH,

Senior Coffee Officer.

APPENDIX "J."

DEPARTMENT OF AGRICULTURE,
NAKURU.

23rd January, 1925.

THE HONOURABLE,

THE DIRECTOR OF AGRICULTURE,

NAIROBI.

SIR,

I have the honour to submit hereunder my Annual Report for the year ending 31st December, 1924.

STAFF.

There are no changes to report.

TRAVELLING.

During the year I was absent from my Headquarters, Nakuru, on duty a total of 206 days, and travelled 6,103 miles by car. Travelling by rail was also undertaken when it was possible to carry out my duties at a less expense than by road.

It will be seen that travelling has been an item of heavy expenditure, the chief cause of which was the long distances it was necessary to travel from one flax district to another. The mileage covered actually in the flax districts was very small in comparison with the total.

Nakuru, although not now regarded as a district suitable for flax, was undoubtedly the most convenient centre from which to work such districts as Gilgil, Kikuyu, Solai Escarpment, Solai, Njoro, Molo, Lumbwa, Kericho, Burnt Forest, and Eldoret, which it was necessary to visit at regular intervals for the purpose of rendering grading and advisory services to flax growers.

CORRESPONDENCE.

The correspondence relating to flax amounted to 686 inward and 711 outward letters, showing an increase on last year of 69 enquiries, the analysis of which are as follows:—

General.	Advisory.	Seed.	British Empire Exhibition.	Reports.	General.
187	142	45	52	38	109

Fifteen letters on flax subjects were received from India, Mauritius, South Africa, Tanganyika Territory, Morocco, Canada and France. Several samples of seed, straw, and fibre were sent on request to these countries.

In addition to above 118 inward and 123 outward letters were dealt with on miscellaneous advisory requests by farmers maize seed selection, sunflower cultivation, and inspection of Coffee plantations.

ROUTINE.—

The programme adhered to throughout the year was in accordance with the demands made on my services for flax grading, having due regard to the quantities offered and distance to be travelled. Where possible, every endeavour was made to arrange grading at a number of adjacent mills during one trip.

It was also possible to combine to a great extent the inspection of several Coffee plantations in the Nakuru area and likewise the visits in connection with the maize seed selection with the flax grading trips.

The time spent at Headquarters was necessary for attending to correspondence and general office routine work.

A return at the end of each month showing quantities of flax and tow graded, amounts collected in respect of fees, etc., was forwarded to the Hon. Director of Agriculture, Nairobi. The grading fees were usually paid to Government through the Senior Commissioner, Nakuru.

WORK DONE.

During the period under review seventy-five Certificates were issued, covering a total of 142 tons Flax Fibre and 132 tons Tow which was graded and checked by the undersigned in accordance with the Government Flax Grading Scheme of 1921.

The amount of revenue derived from this source was Shs. 7,050-05. A flat rate of Shs. 30/- per ton for flax and Sh 10/- per ton for tow was charged, as compared with Sh. 50/- and Sh. 10/- respectively during the previous year. Notwithstanding the heavy reduction of Sh. 20/- per ton on flax the total collection shew only a reduction of approx. £67 on the grading fees for 1923.

In addition a considerable amount of advisory assistance on flax fibre production, Linseed growing, and numerous general farm subjects, was rendered.

Several settlers new to Kenya were advised on various subjects pertaining to farming, and as to the suitability of certain districts for the crop or type of farming they wished to take up.

A circular letter *re* the baling and consigning of flax and tow was sent to growers, and also published in the Press, as it appeared those responsible were not conversant with the most economical procedure and therefore incurring unnecessary expense.

The selection of seed maize as a basis on which to improve the type at present used by maize growers was started in October and continued during November and December on five farms, each representation of a district in the Nakuru area.

For this purpose an average of 700 plants were marked at the following farms :—

C. Cranswick, Esq., Solai.
 J. E. A. Wolryche-Whitmore, Esq., Rongai.
 G. C. Oakes, Esq., Njoro.
 D. P. Proctor, Esq., Nakuru.
 C. Allen, Esq., Solai.

All the plants marked were harvested in due course, and those bearing a cob or cobs with any special characteristics were labelled and stored for further selection, and those of undesirable type discarded. It is interesting to note, in connection with this work, the wide variation in type of plant, cob, and general type of white maize grown on the different farms.

British Empire Exhibition.—Early in January a flax exhibit was completed for the Kenya Section of the British Empire Exhibition, comprising of flax in every stage of production from the seed in the bag right through to the stage in which it is marketed.

One commercially sized bale of each grade was obtained from the following growers, and sent to Wembley for Exhibition :—

FLAX.

Grower.		District.		Grade.
Capt. R. Bingley	...	Gilgil	...	Grade 1 weft.
Canstaff Flax Co.	...	Londiani	...	do. 2 do.
Major W. A. Conduitt	...	Njoro	...	do. 3 do.
H. G. Colquhoun, Esq.	...	Nakuru	...	do. 4 do.
H. C. Coltart, Esq.	...	Njoro	...	do. 5 do.
TO W.				
Major W. A. Conduitt	...	Njoro	...	Grade 1.
Canstaff Flax Co.	...	Londiani	...	do. 2
H. C. Coltart, Esq.	...	Njoro	...	do. 3

To make the exhibit as complete as possible, a quantity of flax and tow of each grade was sent to the United Kingdom three months previously for manufacture into samples of the various linen goods for the purpose of continuing the sequence of linen production at the Exhibition.

Experimental.—Two importations of pedigree flax seed arrived here in March for trial and experimental purposes, one parcel from U.S.A. and the other from Ireland.

A quantity of each variety was sown at Nairobi, Lumbwa, Solai, and Molo, thus embracing four distinct soils and climates, with the object of obtaining reliable average results, also avoid the risk of losing all the seed in case a drought might be experienced at any one of the centres selected. The following table shows the yields per acre obtained at each of the four centres. (See Appendix).

Saginaw.—Is an American production, one lb. of which was obtained when on leave in 1922, and grown at Mr. W. J. Dawson's, Njoro, in 1923. The results obtained were sufficiently encouraging to warrant placing an order for a larger quantity for the purpose of further trial over a few acres, but, owing to the small quantity available, it was not possible to obtain more than 110 lbs. of this particular variety.

In a circular issued by United States Dept. of Agriculture it is worthy to note that the re-selection of Saginaw during 1922 proved more frost resisting than several other varieties including blue Dutch. The circular reads:—"The data on the re-selections offer additional confirmation that frost resistance is a power that varies with different flaxes and is inherited from one progeny to the next in a single plant selection. The re-selections from Saginaw are also more resistant to frost injury than Blue blossom Dutch while it is not safe to generalise on the relation between frost resistance and flax wilt from observations on only fifteen kinds of flax, it is evident that as a rule the flaxes that are most resistant to frost are also strongly resistant to flax wilt. Out of the eight flaxes most resistant to frost, all except one are strongly resistant to wilt, and out of the seven flaxes most susceptible to frost, only one is strongly resistant to wilt and one partly resistant to wilt."

As a result of field observation there is every reason to believe that Saginaw is considerably more resistant to disease than any other variety of flax grown in Kenya, although it would not be advisable to draw any definite conclusion from the results of one season only. Now that the quantity of seed has been approximately trebled it will be possible to grow a fair sized trial plot on wilt infected land during 1925, and if necessary carry on further selections.

J. W. Stewart Seed.—This is also a fresh importation into Kenya, the production of which has occupied many years of careful investigation and study by professor Eyre, Linen Research Institute, Belfast. The following remarks indicate the behaviour of the several varieties grown at the undermentioned centres :—

THE HENRY SCOTT AGRICULTURAL LABORATORIES.

Saginaw gave a good and uniform yield, long straw averaging 43 inches in height, small percentage of stalks branching from root, but not too coarse or woody for good fibre fair seed yield. *J. W. S.* did not give such a heavy yield of straw as *Saginaw* but of finer and better fibre quality, very smooth, and uniform stalks, fine short branches, averaged 40 inches in height.

MR. C. G. STANNING'S FARM, LUMBWA.

Saginaw averaged 42 inches in height, and very strong and vigorous growing flax, rather coarse for the production of fine fibre, but given reasonable retting weather should turn out a grade 3 warp, slightly branched from roots.

J. W. S. averaged 39 inches in height, very fine quality of straw, showing every sign of careful selection. The stalks being smooth and slender with practically no sign of branching from the roots.

The crop appeared healthy almost up to maturity, when it was noticed that about 15 to 20% of the stalks died and did not ripen off gradually. It was thought the crop was diseased, but on mycological examination no fungus was present.

It has been occasionally observed during the first year of growth from newly imported seed that a percentage of apparently healthy stalks die just before ripening commences. This is not the case on subsequent years, except where wilt or other disease has been proved.

MR. H. G. COLQUHOUN'S FARM, SOLAI.

Saginaw again gave the heaviest crop, but in this case it was sown thinly with the object of seed propagation, the straw being coarse and very much branched. The average height was 42 inches.

J. W. S. had a delicate and slender appearance when compared with the *Saginaw*, although a decidedly better fibre quality, 40 inches in height. The unseasonal rains made harvesting difficult, and caused discolouration of the straw.

MR. M. H. ABRAHAM'S FARM, MOLO.

J. W. S. was all that could be desired for fibre purposes, averaging over 50 inches. In some parts the straw was 56-58

inches. The seed yield was low owing to stormy weather having laid a large proportion of the crop just before harvesting. Its period of growth was much shorter than the Dutch white Flowering flax which has been found so suitable for altitudes of 8—9,000 feet.

Dutch White Flowering.—Originally issued to Mr. Abraham by this Department, has done extremely well, producing a long growth of “wiry” fibre. The yields per acre of fibre were 300 lbs. Flax and 180 lbs. tow under ordinary conditions.

MR. G. PATTEN'S FARM, GILGIL.

Dutch White Flowering.—The second crop of this variety grown from a small quantity issued by this Department yielded from the 1923 crop 560 lbs. fibre per acre. The 1924 crop under very unfavourable conditions stands at time of writing 4' higher than the Dutch Blue planted on similar land at the same time. The seed produced from similar issues of Dutch Blue Japanese and Irish origin were discarded in favour of Dutch White Flowering on this farm.

LINSEED.

Canadian Linseed.—Two small samples of the “Premost” and “Novelty” strains of Linseed were obtained from the Central Experimental Farms, Ottawa, Canada, for trial for the first time in Kenya, and are at present growing on Mr. H. C. Coltart's farm at Njoro. The yields are not yet available.

Indian Linseed.—On 17th July an experimental plot of three acres was planted at Messrs. G. and T. Crawford's Solai Farm with seed imported from India two years ago, and which has been grown in the Kavirondo native Reserve during 1922-23. The yields are not yet available.

The White Hoshangabad Linseed.—Referred to in my last annual report, has not been very successful owing to its repeated failure to produce a reasonable proportion of mature seeds, the cause of which has not yet been definitely established. Besides the seed has a sweet taste, of which birds seem particularly fond, and therefore cause any attempt at seed records on small plots impossible.

Several bulletins and letters in connection with linseed growing were obtained from Canada and the Argentine, and the information contained therein passed on to those desirous of taking up the growing of linseed for export.

There has been an increasing interest shown by farmers in the growing of linseed. The F. O. R. price of £12—£14 per ton which ruled throughout the greater part of the year is causing a larger acreage to be planted during the coming season.

Up to the present no disease has made an appearance amongst linseed. Several suspected specimens were sent to the Mycologist for examination, but were found to be free from fungi. At the moment experiments are in hand to test the possibilities of using the ordinary wheat stripper to deseed the larger acreages of linseed. Only a few minor adjustments on the sunshine harvester would appear to be necessary. If successful, labour difficulties will be overcome, larger areas of linseed will become possible and profitable, in rotation with wheat, barley, or maize. A further object of this experiment is to test the possibilities of allowing the deseeded straw to rot "on foot," then pull, and scutch into two. This, of course, applies to the planting of ordinary fibre seed at a less quantity of seed per acre for linseed.

It is worthy of note that European flax fibre seed increased in seed yield when grown in Kenya to an extent that is not, as yet, exceeded by the Indian seed varieties.

GENERAL REMARKS.

In the higher regions the production of flax is now quite a profitable pursuit, as the crops grown in such districts contain a higher fibre percentage, and are less liable to disease; pests such as caterpillar need not be feared at altitudes of over 7,000 feet.

The heavy morning mists and the long period over which the rainfall is distributed provide ample moisture for the growth and retting of the crop, and also serves to keep the stored straw in a cool state for scutching, and the finished fibre in excellent condition for the market. Nevertheless, the total acreage under flax has not as yet shown any increase, but there are individual growers who have doubled their area of flax within the past 18 months, and who maintain it pays better than anything else they could grow. The increase in wheat growing is providing a suitable rotation for flax which already has found favour amongst a number of flax growers.

Flax prices seem to have at last settled at quite a remunerative level, which was maintained and even considerably increased during the year. Tow, particularly during the latter half of the year, has been in good demand, and prices have

advanced £15 to £20 per ton. The advance in the price of flax from an average of £87-10-0 per ton during 1923 to approx. £110 for 1924, and tow from £36-15-0 to £52 per ton, places the flax grower in a much sounder position than hitherto. Flax, flax tow, and the linseed, can to-day be sold "F. O. R. Kenya Station" or "F. O. B." at satisfactory cash prices.

It is the general consensus of opinion that the introduction of Compulsory Flax Grading for many obvious reasons, is of vital importance to the industry. The voluntary Grading Scheme which has been in operation since 1st March, 1921, has worked smoothly and successfully, but was, and still is, rather disappointing in the matter of quantity offered. The success of the scheme may be judged by the fact that for the first time on record Kenya flax and tow, have during the past few months, been sold "on Grade" while still afloat. This is entirely due to Official Grading, the value of which to those directly interested in Kenya Flax cannot be overestimated owing to the fluctuations in market values, and in the quality of each year's crop.

Up to the present no 1924 crop has been exported, and there is still a small quantity of the 1923 crop to come.

I have the honour to be,

SIR,

Your obedient servant,

(Sd.) GEO. M. HAMILTON,

Flax Officer.

APPENDIX.

TABLE OF FLAX EXPERIMENTAL WORK.

Name of Grower.	District.	Variety.	Date of Planting.	Date of Harvesting.	Method of Planting.	Yield per acre of Deseeded Straw.	Clean Seed.	Remarks.
Scott Agricultural Laboratories.	Nairobi...	J.W.S.	10-4-24	7-8-24	Broadcast	2,780 lbs.	235 lbs.	
Do.	"	Saginaw	10-4-24	7-8-24	"	3,440 "	400 "	
H. G. Colquhoun, Esq.	Solai ...	J.W.S.	9-5-24	20-9-24	"	Not weighed.	136 "	For seed propagation.
Do.	"	Saginaw	9-5-24	20-9-24	"	"	360 "	Do.
C. G. Stanning, Esq.	Lumbwa.	J.W.S.	6-7-24	28-11-24	"	3,006 lbs.	242 "	A proportion of seed eaten by birds.
Do.	"	Saginaw	6-7-24	28-11-24	"	3,155 "	210 "	Do.
M. H. Abraham, Esq.	Molo ...	J.W.S.	19-7-24	20-12-24	"	3,550 "	324 "	
Do.	"	Dutch White Flowering	10-7-24	27-12-24	"	3,410 "	280 "	

The fibre percentages and yields per acre will not be available until April or May, as retting cannot take place until the rains set in.

APPENDIX "K".

DEPARTMENT OF AGRICULTURE.

SCOTT AGRICULTURAL LABORATORIES.

31st December, 1924.

THE HON'BLE,

THE DIRECTOR OF AGRICULTURE.

SIR,

I have the honour to submit my report for the period July 1st to December 31st, 1924.

I left Uganda as Assistant Entomologist on the 1st of July, 1924, arriving in Nairobi on July 4th, to take up the duties of Inspector of Plantations which is a new appointment in this Colony.

Travelling.—During the period under review I was absent from headquarters for 97 nights and travelled 2,846 miles by car on Government service.

Inspection.—The inspection of plantations has been carried out under regulations of the Diseases of Plants Prevention Ordinance, 1910, and the General Revision Ordinance 1924.

107 Coffee estates, chiefly in the Thika and Ruiru districts, have been inspected and many of these estates visited several times. Reports on each estate have been already submitted.

General Conditions.—Owing to the partial failure of the long rains and the consequent drought estates have not been looking at their best. Trees have suffered considerably from die-back and much of the crop has turned to buni before becoming thoroughly ripe.

Coffee being a hardy bush and possessing remarkable recuperative powers in this climate, on the advent of the good short rains, the bushes put forth new leaves and masses of flowers, so that now there is every prospect of an excellent crop.

Estates on the whole are generally well cared for, cultivation being clean and good and planters are rapidly realising the necessity for the more thorough application of the general principals of agriculture in the cultivation of coffee than has been done in the past. This is a very pleasing feature in a country so young and where a difficult

crop is being grown by people, the majority of whom have been trained in any branch of life other than that of agriculture.

In only two instances has it been necessary to warn the owners of the consequences of allowing their estates to remain a menace to neighbouring estates owing to the development of disease and weeds.

Diseases and Pests :—The following is a summary of the pests found on 60 plantations visited in the Thika district.

Asterolecanium sp.	
Asterolecanium coffeanum.	
Hemiteia vastatrix.	
Cercospora coffeicola.	
Capnodium sp.	
Root Fungus.	
Grasshoppers.	
Thrips.	
Leaf Miner Moth—Cmimosoma coffeelum.	
Berry Moth—Thiploteras octoguttale.	
Parasa sp. Leaf eating caterpillar.	
Cutworms.	
Borer—Apata monacha.	
Gonocephalum simplex.	
Antestia variegata. Coffee Bug.	
Aphis sp.	
Lecanium africanum. Green Scale.	
Lecanium nigrum. Black Scale.	
Lecanium hami sphaericum.	
Ceroplastes cerieus.	
Pulvinaria psidii.	
Mealy bug.	
Pseudococcus perniciosus.	
311	52
11	54
1	23
7	37
27	27
12	27
58	58
4	4
231	231
254	254
5	5
6	6
31	31
6	6
26	26
6	6

Since the Entomologist and Mycologist have each received copies of my monthly reports, information with regard to the above will be found in their annual reports.

The above table, though conveying little information as to the amount of damage caused by each pest, does indicate which pest, granted favourable conditions, may possibly at some time become epidemic.

Mottled Cherries :—On a few estates many of the coffee berries had a mottled appearance. The beans within these berries were found to be spotted and dark in colour, thus spoiling the appearance of sample of prepared coffee beans.

Specimens were forwarded to the Entomologist and Mycologist but neither insect nor fungus could be found which was responsible for the production of this mottled berry.

Black Tip :—This is the local name for a so-called new disease which was prevalent in the Songhor district where it was causing considerable loss of crop.

A coffee bush suffering severely from "Black Tip" has its young apical leaves blackened, these appearing as if burned. Other leaves in the same shoot may be irregular in shape and malformed. The internodes are very short with the nodes broad and flat from which arise masses of short branches produced in the same plane. The whole bush then has a thick matted appearance and produces few, if any berries.

From the general appearance of the affected bushes, their situation in an estate and the general method of development together with the absence of any visible signs of either insect or fungus pests lead one to the conclusion that the disease is physiological and is caused by unfavourable external conditions, the chief factor being climatic.

I have the honour to be,

Sir,

your obedient servant,

H. WILKINSON,

Inspector of Plantations.

APPENDIX L.

OFFICE OF THE GRADER & INSPECTOR,

Kilindini, January 30th, 1925.

THE HONOURABLE,

THE DIRECTOR OF AGRICULTURE,

Nairobi.

Sir,

I have the honour to submit my Annual Report for the year 1924.

STAFF.

I proceeded on leave on April 13th and returned on November 27th. During my absence the work of plant Inspection was dealt with in Nairobi, the remainder of the work being carried out by Mr. A. R. Teague.

Mr. S. W. Austin, Junior Clerk, left the Department on the 31st August, being relieved by Mr. B. F. Ratcliffe.

INSPECTION OF PLANTS IMPORTS.

During my 4½ months residence in Mombasa of the past year, the undermentioned plants and seeds were imported and passed by me for importation into the country;—

No. of Packages.	Description.	Value.	
		Shs.	Cts.
9	Tree Seeds	83	00
93	Farm Seeds	5,118	41
34	Fruit Trees	2,747	58
404	Tea Seed	24,704	50
9	Apples	210	00
64	Bulbs	1,607	74
151	Garden Seeds	5,749	06
95	Plants	4,309	62
Totals 859		44,529	91

In addition, 34 packages valued at Shs.1906/24 were passed in transit to Uganda.

EXPORTS.

1924 saw the first completed year of the operation of the Maize Grading Ordinance.

The attached table shows the monthly out-turn of Graded Maize for Kilindini and M'baraki combined together with the Grade,

Month.	K1.	K2.	K2. SW.	K5.	K6.	K7.	K8.		Total Graded.	Wet.	My.	Wl.	O.C.	Total Rjctd.	Total Recd.
							SW.	FW.							
January...	463	60,184	...	...	1	...	17,026	10,005	87,679	2,142	2,286	3,364	16	7,808	95,487
February	36	85,056	...	...	...	1	11,037	6,202	102,332	3,841	2,077	1,135	13	7,066	109,398
March ...	...	78,836	...	...	3	193	8,863	10,462	98,357	2,211	3,825	655	26	6,717	105,074
April ...	...	63,975	...	...	92	222	4,411	2,054	70,754	649	327	21	11	1,008	71,762
May ...	...	31,203	...	2	2	...	5,531	485	37,223	1,368	37	31	7	1,443	38,666
June ...	...	28,434	2,086	355	111	143	1,440	762	23,331	161	44	33	5	243	33,574
July ...	...	7,085	2,729	...	...	52	440	622	10,901	748	...	...	...	748	11,649
August ...	...	288	1,038	...	555	6,270	9	...	8,160	2,580	3	12	...	2,595	10,755
September	...	7,022	1,319	220	1,738	24,751	135	279	35,464	5,647	744	6	7	6,404	41,868
October...	...	13,941	73	1,645	558	19,894	964	310	37,385	1,659	170	942	8	2,779	40,164
November	...	11,330	5,190	52	853	53,799	7,380	265	78,869	7,181	1,345	492	317	9,335	88,204
December	...	10,846	6,654	...	226	5,118	10,725	1,435	35,004	6,697	238	645	282	7,862	42,866
Totals	499	398,173	19,089	2,274	4,139	110,443	67,961	22,881	625,459	35,784	11,096	7,336	692	54,908	689,367

REJECTED MAIZE.

Under this heading occurs all the maize for which a certificate of grade was refused. With the exception of the maize rejected under "Other Cases" nearly all this maize was eventually shipped. The wet maize was dried and regraded but a fair proportion of this had to be classed as musty. This was only to be expected when consideration is given to the very inadequate means at the disposal of shippers for drying purposes.

MOISTURE CONTENT OF REJECTED WET MAIZE.

The following are the average moisture contents of the rejected wet maize for the various stations from which it has been railed;—

Station.	WHITE MAIZE.		Station.	NATIVE MAIZE.	
	No. of Bags.	Moisture Content.		No. of Bags.	Moisture Content.
Kibigeri ...	1025	15.7%	Kisumu ...	6854	16.1%
Ft. Ternan ...	809	16.3%	Thika ...	6949	15.4%
Rongai ...	1652	15.7%	Kikuyu ...	1336	16.3%
Menengai ...	454	16.9%	Gilgil ...	172	15.4%
Nakuru ...	1044	15.5%	Moshi ...	1425	15.9%
Miwani ...	300	15.6%	Elburgon ...	2586	17.1%
Londinai ...	272	16.6%	Turi ...	988	17.0%
Eldoret ...	116	15.8%	Molo ...	809	16.6%
Njoro ...	112	15.2%	Kibos ...	443	16.5%
Koru ...	82	15.0%	Lumbwa ...	3411	16.4%
			Kabete ...	110	16.0%
			Escarpment ...	267	15.8%

Much still remains to be learnt on the question of moisture content by producers and dealers in maize. During the year, in spite of the high export limit of 14%, 35,784 bags of maize were found to be wet on arrival at Mombasa and only a small proportion of this was due to damage by rain in transit. The comparatively great heat of Mombasa in no way compensates for the lack of space and high handling charges existing here, and producers, both European and Native, cannot be impressed too often with the necessity of drying this maize properly before railing it.

NEW SUB-GRADES.

After the Grading Ordinance had been in operation for a few months it was found desirable to introduce for Slightly Weevily Maize a new sub-grade to Grade 2 to include all Flat White maize which, had it not been slightly weevily, would have been

classed as Grade Two. This came into force on 14th May, 1924. Up to this time all slightly weevily maize had been put with the Undergrade (K8), the Native, White and Yellow Undergrade maize being kept separate from each other in Block-stack, the Certificates stating which variety was being shipped.

INSPECTION OF NATIVE MAIZE.

A consignment of 200 tons of Native Maize Grade 7, shipped by the S.S. "Ilanstephan Castle" during October was found to have heated to such an extent by the time it had reached Durban that it had to be discharged there. Beyond the fact that the heating of this maize was caused by excessive moisture content, no other details of the occurrence are yet to hand. Whatever the cause may have been, it was decided that it would be necessary to grade all bags of Native maize in two or three places. The extra trouble and work involved would appear to be justified in that the contents of many bags which were found to be dry and sound in one place were wet or of inferior quality in another. There is evidence to show that this variation of the contents was on occasions deliberately arranged, though it is probable that in the bulk of the cases it was entirely accidental and due to the ignorance of the new Export Regulations on the part of some of the smaller up-country buyers.

This necessity is much regretted since it limits the daily out-turn of an individual Grader to about one third of his previous capacity.

BEANS AND PEAS.

Export Certificates were issued at the request of Shippers for the undermentioned consignments of Beans and Peas:—

				No. of Certificates.	Bags.	Charges.	
						Shs.	Cts.
Beans	...	...	...	64	18,337	1,292	02
Peas	...	...	...	1	281	20	00

I have the honour to be,

Sir,

Your obedient servant,

C. C. SHARP,

Grader & Inspector.

